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AND

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The Irish Naturalist.

VOLUME XX.

AN IRISH NATURALIST IN SPAIN IN THE EIGHTEENTH CENTURY.

BY NATHANIEL COLGAN, M.R.I.A.

Two years ago while turning over the second-hand volumes displayed on a barrow in Aston's Place, that favoured haunt of Dublin book-hunters, my eye was caught by a small quarto, full-bound and with richly-tooled back, which lay half buried under a set of Blair's Sermons. On examination the quarto turned out to be the third edition of a Spanish treatise on the Natural History of the Peninsula, written by a native of Ireland and published at Madrid in 1789. A payment of two pence was sufficient to effect a transfer of the property in the volume from the literary man in charge of the barrow to the writer of these notes, the transaction giving equal satisfaction to both parties.

The full title of the book runs thus :—*Introduccion a la Historia Natural y a la Geografia Fisica de España* por D. Guillermo Bowles. It cannot be said that Don Guillermo Bowles is unknown in these countries. The all-embracing *Dictionary of National Biography* has, indeed, a good deal to say about him, most of it drawn from Don Joseph Nicolas de Azara's preface to the second edition of the *Introduccion*, reproduced in the third edition ; yet for all that it is safe to assume that very little is known of Bowles or of his work in his native country, and that a few notes on both may be acceptable to readers of this journal.

William Bowles was born in a village near Cork about the year 1705. Having devoted his youth and early

manhood to the uncongenial study of law, he finally abandoned it and in 1740 proceeded to Paris, where, following his natural bent, he gave himself up to the pursuit of Natural History, Chemistry, Metallurgy, and Anatomy. He subsequently travelled over the greater part of France, making observations on the botany and mineralogy of the various provinces visited. In 1752, meeting casually in Paris with Don Antonio de Ulloa, he accepted the proposal made to him by that gentleman on behalf of the Spanish government that he should remove to Spain and there devote himself to the inspection of mines and to the foundation of a chemical laboratory, and a Cabinet of Natural History. Immediately on his arrival in Spain Bowles entered on an extended course of travel through the Peninsula, paying special attention to its rich mines and mineral deposits, but at the same time making observations in all departments of natural history and collecting specimens for the projected Cabinet or Museum. In his various journeys, spreading over many years, he was accompanied by his wife, Doña Anna Regina Rustein, a native of Germany. Bowles died at Madrid in 1780, and was buried in the parish church of San Martin in that city.

A work long much esteemed for its scientific value as the first attempt at a Natural History of the Peninsula, the *Introduccion* of Bowles may still be read with great interest and especially by Irishmen, since the author makes frequent references in its pages to his native country. The writer is a keen observer and an acute reasoner and speculator, though he more than once cautions his readers that while placing full reliance on his facts they should closely examine his theories. The first edition of the work was published in 1775, and John Talbot Dillon's *Travels through Spain*, published in London five years later, is in substance, though not in form, a translation from the Spanish first edition. The following passages from the third Spanish edition are selected either as containing references direct or indirect to Ireland, or as illustrating the acuteness of the author and the nature of the views then prevalent on vexed questions in natural history.

SAINT DABEOC'S HEATH (*Dabeocia polifolia*).—On p. 403 describing a journey from Pampluna to St. Jean Pied-de-Port by Burguete and Roncesvalles at the western end of the Pyrenees, Bowles has the following passage of considerable interest to Irish botanists as illustrating the endurance of rigorous climatic conditions by our Connemara or St. Dabeoc's Heath :—

All the mountains of Burguete have a deep soil yielding rich pasture for cattle, but the situation is so elevated and cold that it produces neither wheat nor barley Amongst the plants I noticed here were the Yellow Foxglove, Lychnis, Hypericum or St. John's Wort, Wild Mallow, Holly, Saint Dabeoc's Heath (*Erica cantabrica myrti folio subtus incano magno flore*) the Raspberry, Euphrasia, and the Red Whortleberry. All of these plants grow and bloom in a country covered with snow for five months in the year.

The height at which Bowles here gathered St. Dabeoc's Heath was probably about 2,000 feet, and the country is described by Count Henri Russell in his *Grandes Ascensions des Pyrénées* as recalling by its verdure "the humid and mountainous Ireland."

THE POTATO INTRODUCED TO IRELAND FROM SPAIN.—In the following passage of his chapter *De Algunas Plantas de España* Bowles contributes something to the vexed question of the origin of potato cultivation in Europe :—

Potatoes came from America and were brought by the Spaniards to Galicia whence they have spread all over Europe. The first place to which they were carried from Galicia was Ireland, where they thrived to such a degree that they have become almost the sole sustenance of the people.

As De Candolle has shown in his *Origin of Cultivated Plants*, Sir Walter Raleigh was anticipated by the Spaniards in the introduction of the potato to Europe. Whether he was anticipated by some Galician trader in the introduction of the root to Ireland, is a question not easy to decide, for Bowles indicates no authority for his confident assertion that the potato first reached our island from Galicia.

IRISH HOUNDS EXPORTED TO SPAIN.—In a very interesting chapter on the Basque province of Biscay (*De Vizcaya en General*) occurs the following passage, referring, perhaps, to the Irish wolf-hound, which it is well known was frequently exported from our island in former days;

The Spanish term, *perros lebreles*, used in this passage is, however, the equivalent of the English word, greyhound :—

The common wolf is rare because few sheep are kept or because the country being overspread with farmsteads the animals are chased and killed as soon as they are sighted, and for this work the hounds brought into the country from Ireland are excellent.

A FORETASTE OF DARWINISM.—In the chapter already quoted from as containing a reference to St. Dabeoc's Heath, Bowles makes the following remark on the pigs of the mountain country between Roncesvalles and St. Jean Pied-de-Port :—

I remarked that the hogs of all this country had stiff erect ears like the wild boars, because they live at large in the open country as the boars do.

TREE-BEARING CAPACITY OF MOUNTAINS.—The chapter on Biscay, which, amongst other things, notes the abundance there of the *Arbutus* (*Madroño*) in natural groves and of St. Dabeoc's Heath in the open grounds, has the following curious passage :—

It will not be out of place to repeat here the observation, however trite it may appear, that mountainous countries such as Biscay do not produce according to their superficies, but according to their base ; for since plants grow up vertically, the ground in oblique superficies cannot maintain more plants or trees than would be maintained by a plane surface equal to the base, just as we cannot erect on the sides of a triangle more vertical lines than we can erect on its base.

DISSEMINATION OF PLANTS BY LIZARDS.—The following remarks which occur in a chapter on the Tree-fungi of Biscay (*De diferentes Especies de Agaricos que se crían en los Árboles*) would appear to be quite original and to show that Bowles's views were in advance of his time :—

In the northern countries of Spain by reason of their humidity, many mosses grow on walls and on old and hollow trees. These mosses decay and form a vegetable soil in which many plants spring up, because the seeds are carried there by the winds and the birds and the lizards. The greater part of the seeds of these plants pass uninjured through the stomachs of these animals ; for I myself have observed that the lizards swallow the seeds of the violet and deposit them in the walls along with their eggs.

DISSEMINATION OF PLANTS BY CATTLE.—Bearing on this subject of plant dissemination is another passage which occurs on p. 391 in a chapter describing a journey from Bayonne to Madrid by Elizonda and Pamplona. Observing

the peculiar vegetation growing in the neighbourhood of a high-level inn or *Venta*, Bowles says :—

I believe that if a house were to be built and inhabited on the top of the highest and most desert mountain where no plant had ever grown, and if the soil were to be worked up and manured with cattle droppings we should soon see springing up there the plants commonly found in the neighbourhood of villages and in the plains. From this I conclude that it is no good rule for determining the height of various lands to observe generally the plants which grow in each, unless we distinguish the spontaneous plants from those which are not spontaneous ; for if we do not make this distinction the hill of Meudon near Paris will be found to be as lofty as the Pyrenees.

Bowles has much to say on animal instinct, especially the migratory instinct in birds, and on the importance to the lower animals of their highly developed sense of smell, but there is no space here to quote any of his acute observations and reasonings on these subjects nor to give a rendering of his curious parallel between the manners and customs of the Irish and the Basques. The brief survey of his *Introduccion* here given will, it is hoped, suffice to show that the work is one of no small interest and value to all who study what may be called the history of Natural History.

Sandycove, Co. Dublin.

SOME NEW IRISH WORMS.

BY R. SOUTHERN, B.SC.

DOLICHOPLANA FIELDENI, von Graff.

1899. v. Graff : Monographie der Turbellarien, ii., p. 533.

ON the 23rd of July, 1909, I received a large Land Planarian from the Orchid House of the Botanic Gardens, Glasnevin. The "Hammer-headed Worm," *Placocephalus kewense* (Mos.), has been frequently found there, but the present worm is quite distinct from this both in colour and in the shape of the head, which is conical, and not broader than the rest of the body. It appeared to be most nearly related to a species called *Dolichoplana Fieldeni*, described by von Graff (*tom. cit.*), which has been found in Java,

Ceylon, and the Barbadoes. The specimen was sent to Professor von Graff, but unfortunately it was lost in transit. During the following October another specimen was found in the same place. It was sent to von Graff, who confirmed the identification. Since then, several other specimens have been found, and the species seems to be well established in Glasnevin. It is distinguished by the following external characters:—It is up to 160 mm. long, and 2-4 mm. wide. These dimensions depend on the state of contraction, which varies within wide limits. The width of the body gradually diminishes towards the head and tail. Near the tip of the head are two small black eyes. The back is marked by six longitudinal lines, the middle pair being dark brown, the others black. The ground colour is greyish yellow. The lines of the central pair are close together, and comparatively inconspicuous, and do not reach the head. On each side of these, there is a broad black line, running the whole length of the body. Their outlines become diffuse in front, where they fuse together. Outside these, there is a third pair of lines which is not quite so conspicuous. Though there is considerable variation in detail, this relationship of the longitudinal lines is fairly constant. The ventral surface is marked by a broad longitudinal grey stripe, which constitutes the "sole" of the body, on which the animal crawls.

The wide distribution of this species, together with its presence in the Botanic Gardens at Dublin, would show that it is easily carried about alive, probably in the roots of plants, resembling *Placocephalus kewense* in this respect.

PROSTOMA CLEPSINOIDES, Ant. Dugès.

1904. O. Bürger: Das Tierreich, 20 Lief., p. 68.

The occurrence of this fresh-water Nemertine in the Grand Canal at Clondalkin, Co. Dublin, in October, 1908, has been already recorded¹. In November of the same year, it was also found in the Royal Canal, near Dublin.

¹ *Nature*, vol. lxxix., p. 8. 1908.

Professor Benham recorded¹ the discovery of a fresh-water Nemertine living in the River Cherwell, at Oxford. He found only a single immature specimen which was accidentally destroyed before the specific title was definitely determined. He gives some details of its structure, which agree closely with observations on the Irish specimens.

Miss Sheldon says² that Beddard found a Nemertine in one of the tanks in the Botanic Gardens in Regent's Park, London, which he referred to the species *Tetrastemma (Prostoma) aquarium dulcium*, Silliman. The opinion is also given that "it had almost certainly been introduced among the roots of plants, and cannot be considered as a British species." As the last-named species is now considered as probably synonymous with *Prostoma clepsinoides*, Ant. Dugès, this expression of opinion is rather too emphatic. These are the only records of fresh-water Nemertines in the British Isles, and it is highly probable that they refer to the same species, for which the name *Prostoma clepsinoides*, Ant. Dugès, has priority.

Seven species of fresh-water Nemertines, all belonging to the genus *Prostoma* (*Tetrastemma*), are recognised by Bürger (*tom. cit.*, p. 68). Our knowledge of their anatomy is very slight, and is in great need of revision and enlargement. Bürger relies chiefly on their methods of reproduction to distinguish the species, a most unsatisfactory method in practice. As our knowledge of the group increases, it will probably be found necessary to reduce the number of species.

The Irish specimens were 10-15 mm. long. The majority were immature, but a few of them bore eggs. They were reddish-brown, brick-, or rose-coloured; young specimens were pale buff in colour. There are three pairs of eyes on the head, the distance between the first and second pairs being slightly greater than that between the second and third.

The epidermis bears a large number of clear oval glands. There is only a little faint yellow pigment in the skin, but

¹ *Nature*, vol. xlv., p. 611. 1892.

² Cambridge Natural History, vol. ii., p. 118.

the nervous system is deeply coloured. There is a pair of ciliated grooves running backwards from the side of the head, between the first and second pairs of eyes.

The vascular system is easily seen, and of simple arrangement. It consists essentially of three longitudinal vessels which meet just behind, and dorsal to the anus. In front, they meet just behind the brain, and from the wide junction thus formed, a prominent loop runs round the margin of the head.

The base of the stylet is oval and massive; the stylet is slender, and slightly shorter than the base. There are two reserve stylet pouches, each containing 4-6 stylets.

GEONEMERTES CHALICOPHORA, von Graff.

1879. v. Graff: *Morphol. Jahrbuch*, vol. v., p. 430.

Only a single species of terrestrial Nemertine has been recorded from Europe. It was found in the Palm-house of the Botanic Gardens at Frankfort-on-Main, by von Graff, who described it under the above name. It has apparently not been observed since.

On December 17th, 1908, Mr. Halbert found numerous specimens under flower-pots in several hot-houses at the Botanic Gardens, Glasnevin.

Eight species of land Nemertines have been described, and of these, seven live in tropical countries. The first one was found in the Bermudas, and the other six species live in the Pacific Islands, New Zealand, and Australia. It is therefore very improbable that the present species is indigenous in Europe, and it has probably been introduced into its two known habitats with exotic plants. Nothing is known as to its true home. Von Graff found it in the soil of a vessel containing *Corypha australis*, R. Br., a plant indigenous to eastern Australia.

The Irish specimens are 5-8 mm. long, and of a faint yellowish colour. There are two pairs of eyes, the anterior pair being larger and nearer together than the hind pair. There are two stylet pouches, each containing five reserve stylets.

All the specimens were females, and no male of this species has ever yet been observed.

HERPOBDELLA ATOMARIA (Carena).

1894. R. Blanchard : Hirudinées de l'Italie, *Boll. Musci Zool. Torino*, vol. ix., p. 56.

This leech has not been previously recorded from Ireland, though it seems to be fairly widely distributed. It has probably been confused with the closely related species, *H. octoculata* (L.), from which, however, it is easily distinguished by the marked colour-pattern on the back. It reaches a length of 30-35 mm. (1-1½ inches), and a width of 4-5 mm. The body is composed of 26 segments, each segment being formed externally of a number of rings. Segments 5-22 are each composed of five rings. The dorsal surface is coloured with a very dark pigment, and each ring bears a conspicuous transverse row of yellow spots. On the front ring in each segment, the row of yellow spots is much more conspicuous than on the other rings, and hence the appearance of a number of yellow bands on the back. The ventral surface is pale. The genital pores on the ventral surface are separated by three rings, thus differing from *H. octoculata*, where they are separated by four rings. In other respects, such as the number and arrangement of the eyes, girdle, etc., this species resembles *H. octoculata*.¹ This species has been found in the River Lagan; River Annalee at Ballyhaise, Co. Cavan; and at Enniskillen. I have also seen it at Arthog, in North Wales, and Blanchard (*tom. cit.*) figures a specimen from Exeter, in England, without including England in its area of distribution. On the continent it appears to have a wide distribution.

National Museum, Dublin.

¹ Vide R. F. Scharff : The Irish Freshwater Leeches. *Irish Naturalist*, 1898, p. 194.

REVIEWS.

A GREAT NATURALIST.

Life of William MacGillivray, M.A., LL.D., F.R.S.E. Ornithologist, Professor of Natural History, Marischal College and University, Aberdeen. By WILLIAM MACGILLIVRAY, W.S., with a Scientific Appreciation by J. ARTHUR THOMSON, Regius Professor of Natural History, Aberdeen University. Pp. xvi + 222. With illustrations. London: John Murray. 10s. 6d. net.

It will be generally agreed that William MacGillivray deserved a fuller biography than it is now possible for him to receive; but our gratitude ought not, on that account, to be less to the writer—a namesake of the great naturalist—who has done his best with the materials still available to make up for the deficiencies in this respect of an elder generation. From the sketch of MacGillivray's life here presented one gathers much that is of genuine interest regarding the earlier years of the man to whom British ornithology—and, indeed, ornithology in general—owes so much; told principally in extracts from the few volumes of his journals which fortunately escaped destruction when the rest were burnt in an Australian fire. These are written with a freedom and copiousness which enable them to throw real light on MacGillivray's character and the wide range of his sympathies, while illustrating above everything else his wonderful enthusiasm for Nature and his special love for her sternest solitudes. An appreciation of MacGillivray's scientific work by the present occupant of his old Chair in Aberdeen University, Professor J. Arthur Thomson, will to many readers prove the most interesting chapter in this altogether very acceptable book. The greatness of MacGillivray's genius is, of course, beyond dispute; but his writings for several reasons are not so familiar as they should be, and we are therefore glad that the author has devoted the last sixty pages of his volume to characteristic passages from the "History of British Birds" and the "Natural History of Deeside"—the last printed after his death for private circulation by the late Queen Victoria, and containing a few curious misprints which have not been corrected in Mr. MacGillivray's quotations. Still more welcome than the extracts are the reproductions of eight of the drawings of birds by MacGillivray's hand, which are in the Natural History Department of the British Museum. These are of peculiar interest in view of MacGillivray's scrupulous accuracy in regard to attitude. His criticisms on the various museums that he visited during a tour of inspection in 1833 bring out very strongly the importance he attached to this subject, which he seems nowhere to have found satisfactorily studied, or, indeed, studied or appreciated at all. A visit to "the Dublin College Museum" drew forth the remark "there is a considerable number of skeletons, but almost all uningeniously articulated, and in the most preposterous

attitude." Of the Dublin Zoological Gardens, on the contrary, he speaks in terms of cordial praise; but it is noteworthy that his chief reflection after going through them, too, was that "these collections will in time teach zoological painters the characteristic attitudes of animals, of which Audubon and myself are the only persons who have succeeded in attempting to afford an idea in so far as regards birds." It is to be hoped that the time has come when MacGillivray's expectations on this point have been in some measure fulfilled, and when, if he were writing again, he would no longer feel called on to describe as part of his aim that of showing to the public "that ornithology is not necessarily so repulsive as some of its votaries represent."

C. B. M.

A PLEA FOR BIRD-KILLING.

Aigrettes and Birdskins : the truth about their collection and export.

BY HAROLD HAMEL SMITH, Editor of "Tropical Life." Foreword by SIR J. D. REES, K.C.I.E., London. ("Tropical Life" Publishing Department).

Mr. Hamel Smith is an advocate for the traders in ornamental plumage, to whose confraternity he himself belonged until a few years ago. He disapproves very strongly of all the efforts that have been made in Parliament (by Lord Avebury and others) to secure measures to check the killing of birds in tropical countries for the purposes of this trade, and he complains of continual misrepresentations and unfairness being measured out to the traders by those who press for prohibitive measures against them. It is probably true enough that exaggerated charges have sometimes been made; but Mr. Hamel Smith hardly sets an example of greater fairness when he argues that it is hypocritical for Englishmen to profess to see cruelty in the killing of birds for millinery purposes while they themselves think it legitimate sport to kill them for the table. Whatever may be thought of the ethics of sport, there is at least a vast difference between shooting birds whose breeding season is over and shooting them—as must chiefly be done by those engaged in the feather trade—at the time when they are likely to have young in their nests. Leaving the question of cruelty aside, Mr. Smith admits the reasonableness of the wish—even from a plumage trader's point of view—to prevent the most beautiful birds from being exterminated; and his attacks on the Bills that have been introduced for this purpose are chiefly devoted to proving—(1) that none of them, if passed, would suffice to prevent extermination, so long as they stood alone; and (2) that they would be quite superfluous for that object, if effective means could be found for establishing and maintaining a close season for every threatened species of bird at its centre of origin. Both contentions are correct; but they do not carry us very far towards solving the question what is best to be done under the circumstances that actually exist.

C. B. M.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Hamster from Mr. Pierce Mahony. Four new Rhesus Monkeys have been acquired for the large open-air monkey-house, and a Capybara has been received in exchange.

DUBLIN MICROSCOPICAL CLUB.

NOVEMBER 2.—The Club met at Leinster House.

A. R. NICHOLS, M.A. (President), exhibited Irish specimens of *Membranipora spinifera*, showing the peculiar stalked avicularia situated on the zoecium, just outside the row of spines surrounding the membranous front wall.

F. W. MOORE showed an inflorescence and individual flower of *Bulbophyllum lemniscatoides*, Ralfe, a new and very rare orchid from the East Indies. There is only one other species known in cultivation in the section to which it belongs. Both species have peculiar long club-shaped appendages hanging from the backs of the sepals. They are attached by very fine filiform points and move about freely in light currents of air. One of these appendages was shown under the microscope.

W. F. GUNN exhibited Rose stems affected with Parasitic Rose Canker. The disease is caused by an ascomycetous fungus *Coniothyrium Fuckelii* (Sacc.), and was first observed in Ireland about three years since at Larne, Co. Antrim. Specimens were sent to H. T. Güssow, who investigated the disease and described it in the *Journal* of the Royal Horticultural Society (vol. xxxiv., 1908, pt. 2). The first visible evidence of the disease is a reddish discoloration of the bark caused by the invasion of the tissues by the mycelium, followed by numerous minute swellings with apical openings. These swellings are caused by the fruiting bodies which burst through the epidermis in order to liberate the contained spores. As a result of the penetration of the tissues by the mycelium the bark is killed, and as the stem swells by growth longitudinal cracks arise. In the attempt to heal these wounds a growth of callus takes place, which in turn is again invaded by the fungus. The continued struggle between the fungus, which kills the newly formed tissues, and the host which produces the healing cells, results in the unsightly cankered masses, which characterise the disease, and may measure from two to four or five inches in length. If the cankerous growth extends completely round the stem death of the branch ensues. The spores are very minute and gain entrance to the host through wounds in the bark, which may be caused, amongst other ways, by the spines of the Rose itself piercing the epidermis of other branches when blown about by the wind. This disease is quite distinct from the ordinary canker of the Rose which is due to physiological causes, and not to the attack of any specific organism. A longitudinal section of the bark passing through several of the conceptacles was shown under a No. 3 Leitz objective.

G. O. SHERRARD, A.R.C.Sc., showed preparations of *Heliothrips haemorrhoidalis* (Bouché). This species of thrips has recently been found on fuchsias and crotons in Irish greenhouses. It has already been recorded from England, Germany, Austria, Finland, and the U.S.A., and has been found on ferns, dahlias and azaleas as well as on the plants mentioned. The body of the insect shows a reticulated structure which extends to the legs and is especially marked on the head and thorax. The antennae are 8-segmented, the 2nd segment being the widest and the 8th segment much longer than the 7th and terminated by a slender hair. The front fringe on the forewings is poorly developed. The colour of the insect varies from orange to dark brown, in Germany it is known as the "Black Fly." The male has not been found.

Prof. G. H. CARPENTER, B.Sc., showed a female of *Oedemagena tarandi* (Linn.), the warble-fly of the Reindeer, reared from maggots extracted from a male reindeer in the Dublin Zoological Gardens. Maggots and eggs of the species were also shown. The egg has a grooved base, like that of *Hypoderma*, for attachment to the hair. At the apical pole of the egg is a finely reticulated lid-like area which apparently opens to allow the maggot to escape. No such area can be distinguished in the egg of *Hypoderma*. Descriptions with figures will shortly be published in the *Journal of Economic Biology*, vol. v.

CORK NATURALISTS' FIELD CLUB.

JULY 9.—ARDRUM WOODS.—A party travelled by train to Cloghroe, arriving at 3.14 p.m. Mr. J. Scott-Kerr then conducted the members through Ardrum woods and gardens, which adjoin the railway station. The woods are on the estate of Sir George Colthurst and are extensive. Many trees too are of very fine growth. Ardrum House and gardens were next visited. In the gardens, a gigantic rhododendron, and several beautiful flowering shrubs, were seen. Mr. and Mrs. Scott-Kerr subsequently entertained the party to tea, after which the members walked to Cloghroe Junction, a distance of two miles, and returned by train.

AUGUST 13.—CURRABINNY.—Professor H. A. Cummins, M.D., who conducted, met the members at Crosshaven on the arrival of the 3.30 p.m. train. The party then crossed the ferry to Currabinny, where, by kind permission of Mr. W. Guest Lane, the flora was investigated under the guidance of the conductor. Time did not permit a visit to the ancient sepulchral mound or the kitchen-midden. Tea was provided at the Crosshaven Hotel.

AUGUST 20.—BELVELLY CASTLE.—This castle was founded by the Hodnetts, who came here from Shropshire in the 12th century, and also settled at Courtmacsherry. It is now the property of Lord Barrymore, and was visited by special permission. The party arrived at Fota railway station at 4.20 p.m. and walked to the castle, which was then examined, the conductor, James Coleman, M.R.S.A.I., giving its history in detail.

NOTES.

BOTANY.

"The Flora of Ireland," Review.

In both the German and English sections of my article at the head of the first page, "With photographic illustrations by R. Welch, Belfast," forms an essential part of the title. I arranged with Mr. Welch several years ago for the supply of his copyright photographs and was promised certain others as soon as available. Mr. Welch must have been considerably helped in his photographic work by Mr. Praeger, just as the latter's botanical work has been enhanced in value by the photographs. It was a pleasure to me to be the means of bringing before another public, in the most beautiful form yet seen, some of Mr. Welch's work. A casual inspection of other articles in the "Vegetationsbilder" would show that the letterpress occupies a secondary position. I am sorry that in mine I gave the "suspect" *Sisyrinchium angustifolium* a "S. & S.W." instead of "W. & S.W." distribution.

T. JOHNSON.

Royal College of Science, Dublin.

ZOOLOGY.

Worms as Plant Pests.

Mr. A. W. Stelfox writes me from Belfast, November 14th, as follows :— "In answer to your request in the *Irish Naturalist* for injurious worms, I enclose a few specimens from my garden which are most destructive. They seem to live at the roots of the plants, and slowly eat all these away, until the plant is left sitting on the surface of the soil, and of course dies." The worms were immature specimens of *Aporrectodea* (*Allolobophora*) *chlorotica*, Savigny, and it will be news to very many people that the Green Worm is to be looked upon as a pest. I shall be grateful for further communications on the subject, and whenever possible, for *living* specimens sent in tin boxes with a little moss. Matchboxes are not safe, and earth should not be placed in the cases with the specimens.

HILDERIC FRIEND.

Swadlincote.

Irish Water Worms.

Mr. W. de Vismes Kane, D.L., has been good enough to submit to me two annelids dredged by him from the bottom of Lough Mask, Co. Mayo, at a depth of from 100 to 150 feet. The first is a Tubificid, and does not add anything to our knowledge of Irish worms. The other specimen, however, is certainly new to Ireland, whatever it may be. As there is only a single specimen, and that both immature and imperfect, I am reluctant to give it a name. I have, however, for the past two years had so many opportunities of studying *Helodrilus oculatus*, Hoffmeister, that I have very little doubt the Co. Mayo worm is to be referred of that species. Though the worm has been frequently found,

it has never yet shown signs (in Great Britain at least) of a girdle. The shape of the head differs from that of the other Lumbricidi, and the body has a tendency to break up at the septa. There is every reason to expect *Helodrilus* in Ireland, and as I have recently recorded a new species (*H. elongatus*, Friend) for Cornwall, it would not be surprising if more than one species was eventually found to occur in this island. I should be glad if collectors would search the beds of rivers and streams down to the depth of ten inches or a foot, and also carefully delve among the roots of grass and water weeds in streams and along their banks with a view to finding species of *Helodrilus* and other worms. It may be remembered that *H. oculatus* varies from one to three inches in length, is pink in colour, has a number of "hearts" in the anterior segments, and does not possess a girdle. It is one to two mm. in diameter.

HILDERIC FRIEND.

Swadlincote.

***Helix cantiana* introduced in Cork.**

In September, 1901, nineteen full-grown living specimens of *Helix cantiana* brought from Knowle, near Bristol, were placed on a grassy bank at Tivoli railway station, near Cork. The species now seems likely to become naturalized in the locality, as I have visited it several times in recent years and on each occasion found the colony in a flourishing condition, both adults and juveniles being quite numerous. Owing to the proximity of the railway it is possible that the animal may eventually be carried, accidentally or otherwise, to other parts of Ireland.

R. A. PHILLIPS.

Cork.

[For reasons often stated previously, we greatly regret such introductions as this.—EDS.]

Irish Amphipoda.

In a paper entitled Notes on some Amphipoda from the north side of the Bay of Biscay (*Proc. Zool. Soc. London*, 1909, pp. 848-879), Mr. E. W. Sexton alludes to one or two points of interest to Irish zoologists. In 1897 Mr. Walker described some amphipods in the *Journal* of the Linnean Society, which had been collected off the south-west of Ireland. One of these he considered as a new species and he described it under the name of *Parapleustes megacheir*. Mr. Sexton, after a careful re-examination of the type specimen of this species contained in the National Museum of Ireland, comes to the conclusion that it is identical with another amphipod described by Chevreux under the name of *Sympleustes grandimanus*.

Hybrid between Bream and Rudd.

In the *Ann. and Mag. Nat. Hist.* (8), vol. ii., 1908, p. 162, Mr. C. T. Regan alludes to having received from Lough Erne several specimens of fish, which he regards as natural hybrids between *Abramis brama* and *Leuciscus erythrophthalmus*. The Rudd, as he remarks, is fond of joining as an interloper in the spawning of other fishes with the result that hybrids are sometimes produced. Mr. Regan also informs us, on the authority of Major Trevelyan, that this hybrid is known among the Lough Erne fishermen as the "white roach," in contradistinction to the "red roach," which is really the Rudd. The true English Roach does not occur in Ireland, the name roach being there employed for the Rudd, which somewhat resembles the Roach. It is probable, according to Mr. Regan, that William Thompson's *Abramis Buggenhagii* ("Nat. Hist. of Ireland," vol. iv., p. 137), refers to the same hybrid.

American Blue-winged Teal in Ireland.

A Blue-winged Teal (*Querquedula discors*, Linn.) was shot by Mr. W. Bonaparte Wise, on 9th September last, near Ballycottin, in the south-east of Co. Cork, a part of Ireland, as Mr. Ussher points out, famous for the capture of rare birds, *e.g.*:—Griffin Vulture, Spotted Eagle, Little Bustard, most of the rarer Herons, Waxwing, Bee-eater, Yellow-billed Cuckoo, &c. This is the first known occurrence of the American Blue-winged Teal in Ireland, and there appear to be only two authenticated records of its occurrence in Great Britain (near Dumfries and in Cheshire about fifty years ago).

It is an immature full-winged female and does not show any signs of having been kept in captivity, but is possibly not a genuine wild bird; Mr. W. R. Ogilvie-Grant (of the British Museum), who has seen the specimen, writes that he finds this species bred lately at Woburn, Bedfordshire, and that it seems quite possible some of the full-winged young may account for the occurrence in Ireland. The specimen has been kindly presented to the National Museum, Dublin, by Mr. Wise.

A. R. NICHOLS.

National Museum, Dublin.

Black Redstart in Co. Waterford.

A Black Redstart, presumably a male from its dark face, has frequented this house (which is six miles from the sea at Dungarvan) since 27th October. It may be seen in the day-time on the roof, cornices and window sills taking flies and constantly on the move. It often enters the house and seems little alarmed when taken in the hand. I have repeatedly seen birds of this species here in the autumn, and once on the 28th March.

R. J. USSHER.

Cappagh House, Co. Waterford.

The number of Black Redstarts received this autumn from the light-houses has been remarkable, and I rather think it is in excess of any year since the migration statistics commenced in 1880-81.

RICHARD M. BARRINGTON.

Fassaroe, Bray.

THE LATEST FLUCTUATIONS OF THE SEA-LEVEL
ON OUR OWN COASTS.

BY THE LATE S. A. STEWART, A.L.S., F.B.S.E.

[The following paper was read before the Belfast Naturalists' Field Club forty years ago, on 8th March, 1871; and a brief abstract covering two pages was published in the Eighth Annual Report of that Club (pp. 55-57). This was the first of the several valuable papers on the recent geology of the North of Ireland which emanated from Mr. Stewart's pen. In the present paper, the important series of post-Glacial land-movements which characterize the North-east of Ireland are for the first time demonstrated. Other workers had previously examined the Belfast clays, the late Canon Grainger having been particularly active in exploring the rich fauna which they yield; but it was reserved for Mr. Stewart to point out the important lessons which that fauna teaches; his conclusions have been amply verified, and all subsequent work has been built upon the foundation which he laid. This paper, written near the beginning of Mr. Stewart's scientific career, is characteristic of the man—full of careful observation, sound reasoning, and accurate deduction, and expressed in the vigorous English that we associate with all his writings. Five and twenty years ago, when I was working at the deposits which Mr. Stewart had done so much to elucidate, he gave me the manuscript which is now, for the first time, set in type. We are sure that it will be read with appreciation by the many friends whom he has left behind him, and the editors of the *Irish Naturalist* offer it to their readers as a tribute to his memory.—R. Ll. P.J.]

THE level at which we observe the sea to stand on our shores seems perfectly established, and, on a superficial view, apparently destined to endure for ever, or as long as any sublunary arrangements may last. The mind not accustomed to contemplate the mutations which have marked the geological history of our planet, sees in the present sea-level a natural and necessary adjustment, that has had an undisturbed existence from the dawn of creation till now; nevertheless it is, I think, unnecessary that I should in this room attempt to prove that this has not been the case.

As far as can be ascertained, the sea-level has never remained constant for any very great period of time—reckoning geologically; but exaltations and depressions of the surface have gone on since the commencement of the geological record, and have continued down to the conclusion

of its latest chapter. It is to this last chapter that I ask your attention this evening—nay, to a few of the concluding paragraphs of this chapter. I have been endeavouring to arrive at the interpretation of some of the phenomena of the comparatively recent period intervening between the close of the Glacial epoch, and the present time, and to correlate those phenomena as displayed in our own district with similar events in other parts of these islands. During the Glacial period were displayed the last movements on a grand scale of which we have any record: movements so vast even in this region we occupy that I cannot help thinking that the term cataclysmal is properly applicable to them, despite the protest of a powerful and imperious modern school of British geologists, who will not admit the words cataclysm or catastrophe into the geological vocabulary. At the close of the Glacial era, a period of comparative repose was ushered in. But this rest was only comparative. The Quaternary gravels, esker-ridges, raised beaches, and estuarine clays since formed have latterly been provoking much discussion, various opinions have been expressed as to the mode of their origin, but one thing they unquestionably prove—that the geological forces are still working, and have not ceased to work since the times of the Boulder-clay. Movements of elevation can be shown in some places, in others depression is seen to have occurred, and some other regions exhibit evidence of alternate elevation and depression. The last was undoubtedly the case here, and, indeed, I think that it will be ultimately established that these upward and downward movements of the land have been not only general but simultaneous over the country, or over large areas. Allow me at the outset to state the conclusions at which I have arrived, then to give the grounds on which those conclusions are supported, and lastly to try to show that these geological oscillations are no isolated phenomena, but have extended more or less over the British islands.

Well then, I have arrived at the following conclusions:—

(1). At an era far back in post-Glacial times the land here stood at a higher elevation than it does at present. The elevation at that time I conclude to have been some

twenty-five feet higher than at present, or in other words the sea-level was twenty-five feet lower. This may be called the era of the submerged peat.

(2). There was a period which I shall call the *Scrobicularia* period, when the land had suffered depression, and stood at a level a few feet lower than at present.

(3). A renewed depression, when the land sunk still lower; this subsidence I estimate to have amounted to some forty feet at least below the present level or sixty-five feet below the original. This may be styled the *Thracia convexa* period, that shell having then lived in abundance where our present quays stand.

(4). A period of elevation when the many raised beaches that stud our coasts were brought up, and the present shore lines established.

First:—As to the times of the SUBMERGED PEAT and forests. Numerous peat-bogs now covered by marine accumulations testify to a former high level of the land. Peat, as you know, does not grow in the sea, nor in any position in which it will be washed by the tide at high water; consequently when you find it below high water mark the conclusion then is inevitable that the relative level of sea and land must have altered, and thus the peat that grew above the reach of the sea now comes to be below it. Beds of peat are found underneath the town [of Belfast], and under the slob in the ground reclaimed by the Harbour Commissioners at the rear of the Queen's Quay, as you go to the People's Park (so-called), also at Sydenham and further along on the Co. Down side of the bay at Ballyholme. These old mosses are all below high water; that at the Bangor shore can only be seen at extreme low water. On the opposite shore too, at Carrickfergus, is a notable instance, where not only peat occurs but even a forest of ancient trees or bushes, mostly Hazel and Alder, mixed with such marsh plants as flags, sedges and rushes, and extending more or less for about a mile along the shore. Those members of the Naturalists' Field Club who attended the field meeting at the Giant's Causeway in June, 1868, will remember examining a peat bed that crops up between tide-marks near Portrush. They had on that occasion the

advantage of observing a sunken bog telling of a depression of the land, and at the same place a raised beach testifying to a subsequent exaltation of that precise area. These local terrestrial accumulations do not tell of a deep bog, the result of a continuous and uninterrupted growth of the *Sphagnum*. They contain great quantities of branches of trees, with leaves and nuts, and the peat is made up to a great extent of marsh plants as distinguished from bog plants. The indications point to a time when low flats fringed the shores of the bay, and when along its sides there were jungles in which sedges, flags and rushes made up the undergrowth, and Willows, Hazels, and Alders the arboreal vegetation. As to the height at which the land then stood we can only give a negative estimate—it must have been at least twenty to twenty-five feet higher than at present. To arrive at this result you must allow eleven feet for the mean rise of the tide, then for the thickness of the peat bed and its dip under the sea allow nine or ten feet more; its extension downwards below low water we have no means of knowing, but twenty-five feet will, perhaps, be a safe estimate of the elevation of the shore of that period.

(2). THE SCROBICULARIA PERIOD.—This is an exceedingly well marked feature in our estuarine clays. I am about to rest the proofs of what I now advance mainly on those clays, and it may be well to shortly explain their nature and importance. Estuarine deposits are not peculiar to Tertiary or to recent times, but have been formed in the estuaries of ancient lands during all geological epochs. The Wealden estuary is a well-known example. I will, however, use the term “estuarine clay” to designate those clays formed subsequently to the Boulder-clay in existing estuaries all round our coasts. They are usually tenacious blue clays composed of very fine mud, brought down by rivers, and deposited as silt when the river water loses itself in the sea. They contain very little intermixture of gravel, sand, or pebbles, but in most cases shells are abundant; and as they are really shells of the period, that have lived and died on the spot, and not waifs or strays cast up by storms, or washed into a certain position by currents, they

tell us exactly what was the post-Glacial molluscan fauna. These estuarine clays wherever found have a certain uniformity of characters and assemblage of fossils that entitles them to a distinctive appellation. The terms "Alluvium," "Blue Clay," "Silt," &c., so often used in referring to them seem to me too vague, and I propose to use the term "estuarine clay," which will distinguish this deposit as the contemporary and equivalent of the post-Glacial raised beaches. In the geology of recent times these clays hold a place corresponding to that of the raised beaches that have been so much discussed of late. Owing, however, to the fact that the clay deposits require the investigator to turn himself into a navvy for the time being, and to maintain a special outfit for the purpose of working ankle deep in unsavoury mud, they have not been so well examined as the raised beaches; further, no matter how willing one may be, it is only on rare occasions that good opportunities offer for their examination.

We in Belfast may take credit, however, for our share in this line of research. Several members of the Natural History Society have from time to time paid attention to the subject, and the late Messrs. Thompson and Hyndman left behind them collections of the shells. Up to the present time, however, no British geologist has done so much in this department as a member of the Belfast Naturalists' Field Club. I refer to Mr., now the Rev. Dr. Grainger, whose list of the Belfast clay shells is the most complete list of estuarine clay fossils yet published, and as such is always quoted by the writers on this particular branch of geology. The lists I refer to will be found in the reports of the British Association,¹ and in the transactions of Dublin University Zoological Society.² The estuarine clay beds present better opportunities for the study of recent geological history than do the raised beaches. We find in them deposits of considerable thickness which have been continuously laid down. The order of succession is unbroken, and such changes in the fauna as have occurred may be

¹ Report for 1852, Sections, pp. 43-46, 74-75.

² *Proc. Dublin Univ. Zool. and Bot. Assoc.*, i., 202-222. 1859.

made use of to prove physical changes, if such have occurred. The excavations for the floating dock and basin¹ recently constructed by the Harbour Commissioners at what was known as "Thompson's Bank" and the "Point Fields" afforded a capital chance to investigate the deposit of estuarine clay that has been slowly forming in our bay, and of collecting a complete series of its fossils. This clay attains at Thompson's Bank a thickness of over twenty feet. It reaches away up to the Plains, and as far as the first lock of the Lagan Canal, and stretches westwards to the Bog Meadows. It is found under our streets in the low-lying districts, as may be noticed when sewers are being excavated. This clay is also seen at Sydenham, interstratified with the sands of that shore, and at the Kinnegar at Holywood it occurs below the gravel which is so charged with flint-flakes. A bed of blue clay at Ballyholme, I believe, also belongs to the estuarine clay period, and likewise a small patch at Kilroot, which, as at Holywood, underlies flint gravel. The shells in all these various places round the lough are identical with the species collected at the docks, but a bed that I discovered at Magheramorne on Larne Lough yields not only abundance of shells, but also a number of species not found here. I have visited this bed three times, but there are no excavations, and one is restricted to such things as he can pick out at the surface or two or three feet below it. We cannot therefore say that our knowledge of it is complete. But merely picking and scraping as it were at the surface has produced forty-eight species of shells. The profuse abundance of foraminifera is remarkable; on my last visit Mr. Swanston, who accompanied me, brought away some of the clay to examine for these small forms, and we have not met with them so abundant anywhere else in the locality. The dock excavations at Belfast have been carried to a depth of some twenty feet below high water mark. I have availed myself of the opportunity thus afforded, and am able to present you with an account of the fauna of the deposit, and of the inferences that one is compelled to draw from the character of that fauna, and the mode of its distribution. At the lowest portion of the clay reached by digging we

¹Spencer Basin.

come upon a littoral or shore deposit, a bed that is not entirely local, but has been noted in several other places in the British Isles, and is styled the *Scrobicularia* bed.

This bottom bed differs from the overlying clays, not only in the Testacea it contains, but also in physical characters. It is a blackish clay, not nearly so fine-grained, so tough, or unctuous as that nearer the surface. It is charged with a vast number of shells, of a few species, all littoral—shells in fact of Mollusca which usually live between tide-marks on a muddy shore, or on mud-flats near high water mark. They consist of Cockles, Periwinkles, and Mussels, with *Tapes decussatus*, now comparatively scarce in the bay, and *Scrobicularia piperata*, which at present does not live here, nor indeed anywhere in the North of Ireland.

This *Scrobicularia* bed tells of a time when the sea stood at a level slightly higher than at present, and when at high water the Bog Meadows were covered by the tide, as also the Plains, and much of the low ground on which the town now stands. This level must have been constant or nearly so for a long time, as the accumulation of mud amounted to four or five feet more or less over a large area. It is replete throughout with shells of the same species, and its lithological characters are always the same.

I consider then that the *Scrobicularia* period continued for a very considerable time with little change of level, and was succeeded by a period of depression. This constitutes my third period, the period when *Thracia convexa* was dominant. The rate of this depression was rather quick ; at least the sinking, if not rapid, was at any rate not of the nature of those slow movements or supposed movements attributed to historic times about which there has been so much discussion.

3. The advent of the THRACIA CONVEXA period was marked by a rather abrupt change from a blackish clay to an extremely smooth tenacious clay which was light blue or slate-coloured. The altered character of the clay indicates a change of the conditions of deposition, and was accompanied by a great change in the fauna. The littoral shells which had exclusive possession of the bottom disappear, and are replaced by shells of species that are

usually brought up by the dredge where the depth of water is five to ten fathoms. While I speak of the change as rather abrupt I do not mean to say that it was sudden or instantaneous, but just to point out that the stability that marked the preceding period had ceased and given place to a period of active depression. The maximum depth to which the land subsided was not reached all at once, for we find the new order of things inaugurated by the appearance of the two boring shells, *Pholas candida* and *Pholas crispata*, in clay just slightly higher than the surface of littoral shells. These Pholads live still in the bay at low water and slightly above it, and their appearance in the clay is the first intimation of the subsidence then commenced. As we rise upwards in the deposit, the shells indicate a greater depth of water on the bottom which they inhabited. *Lucinopsis undata*, *Cardium echinatum*, and *Scrobicularia alba* become the most abundant fossils, and are found in the utmost profusion. The range of these shells in our bay is for the first-named 5-10 fathoms, for the second 10-20, and for the third 8-10 fathoms. I have preferred, when giving the range of these shells, to quote the reports of the Belfast Dredging Committee of the British Association.¹ Mr. Jeffreys gives a greater vertical range for most species, but as his is the range in depth for the whole of Britain, it is evident that it does not give the limits of bathymetrical distribution for any one locality as accurately as does a report founded on observations made in that locality. *Thracia convexa*, *Thracia papyracea*, and *Panopea plicata* are interesting shells that now make their appearance in some plenty. The last-named is a rare British shell, and has not been found elsewhere in Ireland. Fine specimens of *Axinus flexuosus* occur plentifully, and also immense shells of the solitary deep-water variety of the Oyster—*Ostrea hippopus*. In investigating this deposit, and making a collection of its fossils, I had a twofold object before me : firstly, to ascertain with precision the fauna of the period, and secondly, from that fauna to deduce the climatal and bathymetrical conditions under which the bed was laid down. With regard to climate the result seems to be that

¹ Brit. Assoc. Reports for 1857, 1858, 1859.

there has been little or no change. All the abundant shells are species that are found in both northern and southern areas, and consequently nothing can be inferred from their occurrence. Of the less common forms one has been considered South European, and three or four are of northern type. The indications are therefore to that small extent northern. However, there is very little in the point, as the recent British Mollusca have on the aggregate a northern aspect.¹

As to the conditions of depth we have positive evidence, that evidence proving a level different to what is now established, though only negative as to the amount of change. We know the limits between which certain shells live, and knowing these limits, we may, when we find them fossil, form an estimate to guide us to the depth of water which existed at the time they lived. Thus by considering the shells, and their known habits, we may come approximately to the result.

I give you the names of twenty of the most abundant shells of this zone of the clays—I mean the *Thracia convexa* bed. Examine the dredging reports before-mentioned, take and put down the lowest number of fathoms recorded for each of these twenty species, tot up the whole and divide by twenty. The result by this system will be a depth of about seven fathoms as the depth of the water at the time when the animals enclosed in these shells were living at the bottom of our bay in thousands and tens of thousands. I have selected ten univalve and ten bivalve shells, the ten which I found most abundant of each group; by the method I have pointed out you get as the minimum depth of water seven fathoms, and it is remarkable that if you reduce the number, and take the five commonest shells as guiding species, you get by this process the same result, a minimum of seven fathoms. It is possible, however, that a greater depth of water may have existed at that time. It is open to us also to take the maxima of recorded depths, and that would give a depth of about double what we have arrived at by taking the minima. I am, however, inclined to take

¹ Further investigations have revealed a distinctly southern aspect in the fauna of the *Thracia convexa* bed.—EDS.

the lower estimate, and set down the depth of water during the *Thracia convexa* period as some forty feet or thereabouts at the site of the present floating dock. There are two reasons for this preference; one reason that influences me is that in my own experience I have met many of these species living in water one or two fathoms shallower than has been recorded, and secondly I have found that these shells occur more abundantly about the upper limit assigned by the Dredging Committee, than they do near the lower limit.

(4). When subsidence had gone on to this extent, another change occurred—a movement of elevation which finally brought up to the surface a sea-bottom which had once been covered with at least six to seven fathoms of water. The shells of the deeper water become more and more scarce, *Thracia convexa* disappears, and at the top of the bed we meet only littoral shells such as *Mya arenaria*, *Cardium edule*, *Cerithium reticulatum*, Littorinae and mussels.

If I have been able to prove that the previous depression occurred as stated, and that this clay was deposited as mud at a considerable depth, it will not be necessary to dwell on the proofs of elevation, as it follows from the present position of the bed. The upward movement was slow and long-continued, and possibly interrupted by breaks or pauses of longer or shorter duration. A remarkable bed of sea-urchins appears to indicate such a pause. On this bed, which is situate some six or seven feet below the surface, there is spread out like a sheet a continuous covering of the tests of *Echinus miliaris*, a small echinoderm that is common in our bay. The shells are placed side by side, and in most cases so close as to be either touching, or nearly so. I have not dredged over any ground on which any sea-urchin was so plentiful as this must have been on the estuarine clay. Nor do I know of the species living here in such great profusion at present, and I consider that a pause is indicated, giving time for the aggregation of so many on one surface. The shells were not piled up there by currents, but appear to have lived and died as found, side by side.

I have now to connect or correlate these phenomena

with similar changes that have been noted as having occurred in other parts of Britain, and I may say at starting that I do not believe that any of these movements, whether of elevation or of depression, were at all local. I believe that they were spread over the British Islands in a greater or less degree, traces of them being observable, not only in North Britain, but in Cornwall and Devonshire, and at many immediate points.¹

[There follows a careful review of the evidence then available (now very largely augmented) of post-Glacial movements elsewhere in Ireland, and in England and Scotland. Considerations of space compel us to omit this, which, in any case, does not possess so much interest for us as the record of Stewart's own work and conclusions.—Eds.]

I shall close with a summary of the points I have[]] advanced.

(1). Era of submerged peat. Land some thirty feet higher than at present. Shore fringed with low-lying woods—Hazel, Alder, and marsh plants predominant. This period is synchronous with the times of the sunken peat beds of the south and west of Ireland, with the Norfolk and Somersetshire submerged peat and forests, and with similar growths now found buried below the carse clays of Scotland.

(2). Era of Scrobicularia. Land depressed some ten feet or thereabouts lower than at present. Deposition of several feet of clay on a muddy flat shore. Littoral shells in the ascendant.

(3). *Thracia convexa* period. Further depression. Deep water where our quays and docks are now built. Littoral shells replaced by shells of the Laminarian and Coralline zones. This is the time that corresponds with the recent deposits of clay on various points of the Irish and English shores, and also with the time when the old coast line of Scotland stood some forty feet higher than that now existing.

(4). Elevation. The present sea-level established here. Similar upward movement in England and Scotland as shown by raised beaches, and old terraces further back than the existing beach.

¹ On this point see Coffey and Praeger: *The Larne Raised Beach*. *Proc. R.I.A.*, xxv., C., pp. 157-163. 1904.—Eds.

ON A SPIDER NEW TO SCIENCE RECENTLY FOUND IN IRELAND.

BY A. RANDELL JACKSON, M.B., D.SC.

[Plate I.].

ERIGONE WELCHII *sp. nov.*

SEVERAL examples of this spider were sent to me by Mr. D. R. Pack-Beresford in the autumn of 1910. These appeared to us to belong to an undescribed species. I submitted the specimens to the Rev. O. Pickard-Cambridge, and to Professor Kulczynski, both of whom confirmed our opinion. In the male sex this spider is very distinct from all the other British species of *Erigone*. The female, however, as is usual in this genus, is not very strikingly different from its congeners, but if the two examples we possess are typical, the structure of the vulva would, I think, enable the species to be recognised without very much difficulty. This organ, however, is subject to a good deal of variation, and possibly the determination of the females of this species may always be difficult.

The CEPHALOTHORAX of the male measures 1.45 mm. in length, it is of a dark reddish-brown colour, almost black in fact. The femora and subsequent joints of the legs and palpi are clear yellow-brown, whilst the falces and coxae are of an intermediate hue. The sternum and maxillae are dark reddish-brown, the latter, as is usual in the genus, being studded in the male sex with numerous large nipple-shaped prominences, each bearing a bristle. In the females these are less numerous, and a good deal smaller.

The ABDOMEN is of a pale dingy brown colour.

The facies of the male is very like that of the other members of the genus. The palpal differences can, however, easily be made out with a pocket lens, and I think that a little practice would enable the species to be recognised with the naked eye.

The FALCES of the male bear on their external borders a series of seven very strong teeth. Some of these, at any rate, bear rather short hairs. The teeth are very much stronger than those found in a similar position in the other British members of the genus, with one exception.

The PALPI of the male are most characteristic. Each femur, near its base, exhibits several extremely long teeth. Each of these bears a hair which usually arises from some point a little removed from the apex of the tooth. These large teeth arise from the whole under-surface of the joint and are arranged uniserially, there not being room for another series of teeth, although very small granulations may be found on the lateral borders of the joint. The large teeth are only three or four in number, the series of hair-bearing processes being continued nearly to the distal end of the joint as a number of tiny granulations, each carrying its hair. This arrangement is found in no other British *Erigone*. The femur is 1.21 mm. in length.

The patella is .51 mm. long. It bears a most characteristic apophysis at its distal end. This is curved, and thus difficult to measure. Seen from the outer side it measures .43 mm. from the dorsal surface of the distal end of the patella to the point where the inward curve occurs, the total length, including the curve, being nearly or quite equal to that of the article itself. In shape the apophysis is tapering, curved, and pointed at the extremity. It is directed downwards, slightly forwards, and finally near its termination it is bent sharply inwards.

The tibia, from its articulation with the patella to the tip of the external process, measures .45 mm. Its height at the apex between the tip of the superior process and that of the inferior one is .31 mm. It presents a slender curved stem with a distal expansion bearing four processes or apophyses. Of these the dorsal or superior one is bluntly pointed. The inferior one is slightly gibbous on its lower surface, but bears no actual tooth in the examples examined. The internal process is squarely truncated, whilst the external one is narrow, pointed and curved, being directed forwards and upwards. The shape of these apophyses is quite unlike that of any of our British species, and differs distinctly from all the figures of the other species shown in Kulczynski's monograph.¹

The tarsus measures .49 mm., it bears a paracymbium similar to that found in other species, and is in no way characteristic.

¹ *Erigonae Europaeae addenda ad descriptiones. Bulletin de l'Académie des Sciences de Cracovie, Oct., 1902.*

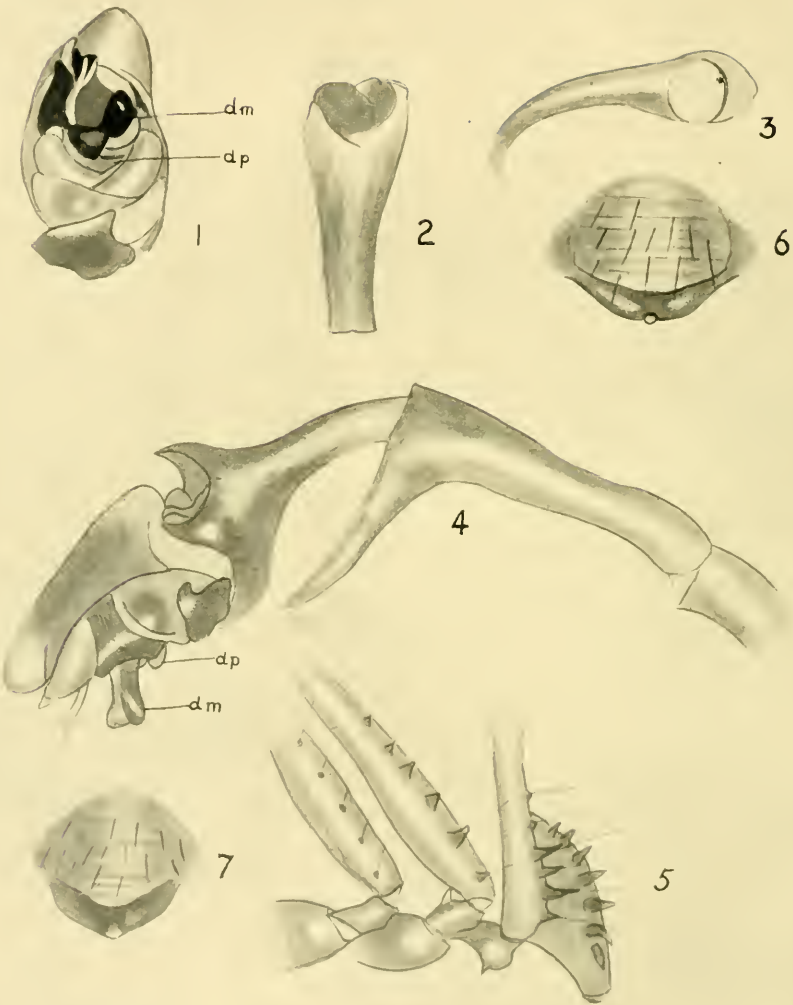
The PALPAL ORGANS are very distinct and complex. The dens medius is of extraordinary size and complicated shape. It rises from the middle of the palpal organs and runs as a broad plate downwards and inwards. The dens posticus is small and inconspicuous. The structure of these organs seems quite unlike that of any other species.

The FEMORA of the walking legs bear a number of hair-carrying prominences. In the case of the two posterior pairs these are very small granulations. On the second pair a median row of granulations are larger and might almost be called denticles, whilst on the first pair these are of enormous size and form a series of very large teeth. They still, however, carry hairs, which usually rise from some place not quite at the apex.

The VULVA of the female is fairly characteristic, but only two specimens are as yet to hand, and it may be found to be a variable character. In these specimens the posterior border forms a rather characteristically shaped ridge, which, if always present, would enable one to identify the species fairly easily. The vulva of *E. longipalpis* Sand. is the one which approaches it most closely, and a further series of *E. Welchii* should be obtained for comparison.

In the male sex *E. Welchii* resembles *E. spinosa* Camb., and differs from all the other British species in possessing a curved patellar apophysis, very strong teeth on the outer borders of the falces, and strong hair-bearing teeth on the femora of the first and second pairs of legs. It is, however, impossible to confuse it with *E. spinosa*. In a male of that species measured by me the patella of the palpus was .40 mm. in length, whilst its apophysis measured from the outer side (inward curve not included) was only .21 mm. long. This apophysis besides being much shorter is directed much more forwards, and its tip is curved inwards and slightly backwards. The article, too, exhibits small lateral denticles. These occur on both sides and are mostly very small, but two on the inner side attain quite respectable dimensions. A further difference exists in the femora of the palpi. In *E. spinosa* these bear beneath several imperfect rows of small denticles which are placed on the proximal three-quarters of the joint. They do not decrease in size from the base towards the apex. Some are sharp and some





ERIGONE WELCHII.

blunt, the exact arrangement seeming to vary in different specimens. All bear hairs. The femur in the specimen measured was .67 mm. long.

The denticles on the femora of the first pair of legs are not unlike those seen in *E. Welchii*, but those on the second pair are almost or quite as large as those seen on the first, instead of being very much smaller, as in the species now described. The tibiae and their apophyses are very different indeed from those of *E. Welchii*, as Mr. Cambridge's recent figure shows,¹ and the palpal organs are quite dissimilar in the two species, *spinosa* lacking the enormous dens medius, and having the whole group of organs small and inconspicuous. The vulva of the female *spinosa* differs markedly from those of all its congeners, and could not possibly be mistaken for that of *E. Welchii*.

Mr. R. Welch of Belfast obtained three males and two females of this species near Bunbeg in County Donegal, in September, 1908. These were probably obtained on the Carrickfin peninsula, and not very far from the sea. I have great pleasure in connecting Mr. Welch's name with this fine and distinct species, especially as he has already added *E. capra* Sim. to the fauna of the British Islands.²

I must thank Mr. Pack-Beresford for sending me the specimens, and Mr. Cambridge and Professor Kulczynski for having so kindly examined them. M. Simon also has been good enough to send me French examples of *E. spinosa* Camb., and Mr. Falconer has contributed some notes on the English examples of that species, of which I only possess the aforesaid continental specimens.

DESCRIPTION OF PLATE I.

Erigone Welchii (sp. nov.)

1. Tarsus and palpal organs of right side from below.
2. Right palpal tibia from above.
3. Right patellar apophysis from the front—tibia amputated.
4. Left palpus from outer side.
5. Falx, and proximal joints of palpus and first two legs. Right side from outer aspect.
6. Vulva from below.
7. Vulva from below and in front.

dm. = dens medius.

dp. = dens posticus.

¹ *Proc. Dorset Nat. Hist. and Antiq. Field Club*, vol. xxx., 1909.

² *Irish Naturalist*, vol. xix., 1910, pp. 141-145.

“OURSELVES.”

It is with much regret that we record the resignation from the editorial staff of this magazine of Robert Patterson, F.L.S., who feels that the increase of work in which he is now engaged will prevent him from continuing that help which he has afforded us for eight years past. The colleague-ship of an Ulster naturalist has become necessary for our healthy development, and we have the greatest satisfaction in announcing that Robert Welch, M.R.I.A., President of the Belfast Naturalists' Field Club, is henceforth one of “Ourselves.”

NEW GLEANINGS.

The National Museum.

R. Southern, who has been since 1905 Assistant in the Natural History division of the National Museum, is now transferring his activities to the Irish Fisheries Office, where he will work as Assistant Naturalist. A vacancy on the staff of the Museum thus arises, and we understand that the new officer will be expected, on his appointment, to devote most of his time to the insect collections.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Lion Cub, three young Leopards, a Serval, and two Caracals from Mr. Murphy, a pair of Jerboas from Lady Constance Britten, a Crowned Crane from Mr. W. C. F. Robertson, a Carolina Drake from the Kew Botanic Gardens, a Sanderling from Miss Burne, four Peafowl from Mr. J. C. Johnston, and a pair of Cygnets from Mr. W. M. Murphy. An especially valuable collection of New Zealand birds have been presented by the Government of that Dominion, through the kind offices of Lord Plunket, comprising two Owen's Kiwis, two Keas (sheep-eating Parrots), three Weka Rails, four Grey Geese, and five Paradise Geese.

The Society has lately issued an Index to the Minutes of the Council from 1830 to the end of 1907. This index forms a neat pamphlet of 96 pages, and a glance through its entries enables the reader to estimate the dates of many new buildings and improvements in the Gardens, and of the receipt of famous animals. In a short preface, the Hon. Secretary, Dr. R. F. Scharff, states that the compilation of this index has been carried out by Miss C. S. Cree during the past three years.

DUBLIN MICROSCOPICAL CLUB.

DECEMBER 14.—The Club met at Leinster House. A. R. NICHOLS (President) in the Chair.

Prof. G. H. CARPENTER showed the mouth-hooks and supporting sclerites of the maggot of *Oedemagena tarandi* (Linn.), the warble fly of the Reindeer. The mouth-hooks of this larva are very small, each shaped like a double bow, and the supporting sclerites articulate with a strongly chitinized and ridged area on the ventral wall of the pharynx. The structures are figured by exhibitor in the *Journal of Economic Biology*, vol. v., p. 150.

R. SOUTHERN exhibited specimens of the parasitic Nematode worm *Trichocephalus affinis* (Rud.) from the intestine of the pig. This species is easily differentiated from *T. crenatus* (Rud.), the species generally found in the pig. *T. affinis* is commonly found in the sheep, and more rarely in the ox, but appears never to have been recorded in the pig. The specific characters were demonstrated. The specimens are Irish, though no definite locality is known. They are in the collections of the Irish National Museum.

G. O. SHERRARD exhibited a small nest of *Vespa sylvestris*, Linn., whose construction had been begun on the frame of a bee-hive at the Albert College, Glasnevin, in the spring of 1910.

J. BAYLEY BUTLER showed a stereoscopic microscope (Braus-Druner) by Zeiss, with young specimens of living Echinoderms. The several advantages of this instrument, notably stereoscopic effect, long working distance, depth of focus, and mechanical movements were demonstrated.

Dr. R. F. SCHARFF apologized for bringing a macroscopic object to the Club, but thought he was warranted in doing so owing to the exceptional interest of the exhibit. This was the complete skull of *Smilodon californicus*, a Sabre-toothed Tiger from the Pleistocene asphalt deposits of Rancho la Brea in Southern California, recently acquired by the Irish National Museum. Dr. Scharff pointed out the chief features of interest in the skull, and remarked that, owing to the shortness of the coronoid process of the lower jaw, the temporalis muscle must have been much longer than in the recent Tiger. The arrangement and length of the digastric, masseter, and pterygoid muscles also were somewhat different, enabling the Sabre-toothed Tiger to open its jaws far more widely than the recent Tiger. The mouth could be opened sufficiently wide to enable the animal to grasp the prey perfectly well with the great upper canine teeth.

D. M'ARDLE exhibited *Arcyria punicea*, Pers., one of the Mycetozoa which he found growing on decayed wood in the Botanic Gardens, Glasnevin. It first appeared as a white plasmodium, which afterwards developed numerous sporangia 1·8 mm. high, 0·8 to 1 mm. broad, having a cylindrical stalk 0·5 to 1 mm. high, 0·1 mm. thick, furrowed, colour red-brown, filled with spore-like cells and the sporangium of a bright crimson colour with a well marked cup to which the capillitia are attached. It is an elastic network of flattened red threads with thickenings in the form of cogs or spines on one side only, arranged in a loose spiral. The spores are pale red nearly smooth. The capillitium and spores were

shown on a separate slide. The species is evenly distributed in Ireland, nowhere common, widely distributed in England, reported from the Continent through the tropics and New Zealand.

BELFAST NATURALISTS' FIELD CLUB.

NOVEMBER 15.—The President of the Club (R. J. WELCH, M.R.I.A.) read an address on "Facts about the Distribution of some Plants and Animals." After some preliminary remarks, Mr. Welch said he felt he could not do better than select for his subject some facts connected with geographical distribution, with special reference to animals and plants found in their own country. He would not confine himself, however, entirely to the latter, but show some results obtained also abroad, and here he might mention the fact that Ireland now was the most thoroughly organised country in the world for scientific research in the field. To this was due the fact that Irish workers had been enabled in recent years to carry out such a number of carefully-conducted surveys in the less-known corners of the country, and were at present at work at the most complete survey of an island area that had ever been attempted anywhere. He referred to the survey of Clare Island, and the reports on that work were mostly now well advanced. Some would be presented to the Royal Irish Academy this winter, though a number of groups would not be finished till next autumn. In this survey eight or nine of their members were taking an active part, as some of them did in the Lambay survey, and in all of the Triennial Conference work since 1895. Zoologists and botanists making a special study of distribution now recognised that island faunas and floras, especially large islands like Ireland, that had been long detached from Continental areas, were especially useful in that they were not so subject to keen competition as the Continent itself. On the island areas the primitive characters lasted much longer, and nowhere in recent years had this fact given rise to more discussion than in connection with certain elements of the Irish fauna. Points had arisen from time to time over specimens sent to specialists to report on as to whether these were species not hitherto described or merely races differing in a more or less marked way from those of Great Britain and the Continent. A number of groups were under revision in Ireland at the present time in connection with up-to-date geographical lists. In addition to many published in recent years by the Royal Irish Academy, *Irish Naturalist*, or in their own Proceedings, Mr. Balfour-Browne had in hands a list of the Water-beetles; Mr. Foster, the Woodlice; Mr. Orr, the Wasps and Wild Bees; and Mr. Stelfox, a census of the Land and Fresh-water Mollusca. It was from lists such as these that deep students of geographical distribution, like Darwin or Wallace, got the detailed information necessary for the preparation of such maps of distribution as he would show them that night. It was, too, in such work, steadily and accurately carried out, that a Club like theirs, though mainly composed of amateur workers, could best help along the greater and more complete work of the British Association, with which they had long been in close connection, or the more national Irish work of the Royal Irish Academy. In the slides which he was about to show them

he wished to call special attention to the evidence which the distribution of many animals afforded of old land connections—or land-bridges, as they were sometimes called—between this country and the Continent, and especially between the Britannic area and America, the latter being a connection questioned by many geologists. He was afraid the geologist too often ignored the help which the zoologist and botanist could give in this direction. While the modern student in these groups had usually obtained a fair knowledge of general geological facts, the average geologist seemed to take little interest in many zoological or botanical facts which had a distinct bearing on geology. Among others he need only point to the enormous multiplication of species in fossil nomenclature, which would be avoided if the palæontologist gave more attention to variation due to environment or other causes. The President then proceeded to explain a series of illustrative and diagrammatic slides which were thrown on the screen, commencing first with the Lusitanian or southern types of animals and plants which seem to have entered the country in very ancient times over a land connection, long now gone, between the South of Ireland and the Spanish peninsula. Examples, such as the *Arbutus*, the Kerry Saxifrage, the Spotted Slug of Kerry, and the *Hyæna*, were given, the last having left its remains in some of the southern caves. Next the western or American elements of our fauna and flora were referred to, such as the Killarney Fern and the not long extinct Great Auk, with some land shells. Passing to the northern or arctic survivals in our fauna and flora he showed the distribution of such animals as the Fresh-water Pearl-mussel, the Irish Hare, the Mountain Avens (*Dryas*), and among the extinct animals the Reindeer and Mammoth. The eastern or Germanic types followed, when animals such as the Irish Elk, the Beaver, Swallowtail Butterfly, and Roman Snail were touched on. A few interesting cases of very restricted distribution and references to the glaciation of the Brandon mountain range in Kerry closed the address.

At the conclusion of the address an animated and interesting discussion took place, in which the following took part:—N. H. Foster, W. J. C. Tomlinson, F. Balfour-Browne, H. Lamont Orr, and William Swanston.

The President then read a list of the various sectional meetings to be held during the present session, and a new member, R. H. Whitehouse, M.Sc., was elected.

NOVEMBER 19.—BOTANICAL SECTION.—Rev. C. H. WADDELL, B.D., in continuation of the subject of the ecology of plants which had been commenced the previous season, gave an account of plant life in the woodlands.

NOVEMBER 23.—ARCHÆOLOGICAL SECTION.—A. Milligan in the chair. W. J. FENNELL, F.R.I.B.A., read a paper on Bangor, County Down, and the great abbey formerly existing there.

DECEMBER 14.—GEOLOGICAL SECTION.—Lecture by J. STRACHAN on "The Onyx of Spanish Bay, Giant's Causeway; its Occurrence and Origin," illustrated with micro-sections, and specimens. W. J. C. Tomlinson, Chairman of the Section, presided. In the course of this communication, the Lecturer said that onyx, a banded opal, is found with chalcedony and other minerals in the gas-cavities of a lava at the east end of Spanish Bay, Giant's Causeway. The rock is of the basaltic-

andesite type and contains an interstitial volcanic glass practically identical with the hullite found at Carnmoney. In fact it is the type of lava that probably flowed from the old neck at Carnmoney. The rock is an augite-plagioclase mixture with the feldspars occasionally porphyritic. The residual glass contains inclusions of feldspar, augite and magnetite, and also forms layers round the onyx. The lecturer gave reasons for believing that, like other minerals similarly situated in lavas, the onyx had been deposited during the cooling and consolidation of the lava.

DECEMBER 17.—BOTANICAL SECTION.—Several workers of the Botanical Section met in the Museum, and exhibited rare and interesting plants collected by them during the summer preceding. Rev. C. H. Waddell, M.A., occupied the chair. N. Carrothers and Rev. Mr. Waddell had many fine specimens, and Miss Blackwood's plants collected by her in Brittany evoked much interest.

DECEMBER 20.—W. A. GREEN read a paper entitled "The People of the Dawn," with special reference to B. N. F. C. investigations in the North of Ireland. The President (R. J. Welch, M.R.I.A.) occupied the chair. The paper dealt with Neolithic man and the remains which he has left in Ireland.

DECEMBER 27.—EXCURSION TO ST. JOHN'S POINT.—After a lapse of several years the "boxing-day excursion" was this season resuscitated, when twelve members travelled by train to Killough and spent the day on the promontory of St. John's Point, Co. Down. The route taken from Killough to St. John's Point lay along the coast, which, though low is extremely rocky, consisting for the most part of hard grits and shale, of the Llandovery Group (Silurian).

Very few plants were seen in flower, but the botanists were rewarded by observing the following rarer plants in their winter condition:—*Crithmum maritimum*, *Artimisia maritima*, *Beta maritima*, *Atriplex portulacoides*, and *Asplenium marinum*.

Thirty-three species of birds were noted during the day. The most interesting ornithological observation was that of about fifteen Oystercatchers, *Hæmatopus ostralegus*, following the plough, in company with Lapwings and Gulls, in a field near the lighthouse, this trait in the habits of the Oystercatcher being novel to the members.

A fair list of land-shells was made. The Hyalinixæ, *Helix hispida* and *Vitrina pellucida* were particularly common, active, and large; while the southern species, such as *Helix nemoralis* and *H. aspersa*, were all in a state of hibernation. Near Downpatrick *Amalia gagates* and *A. Sowerbyi* occurred in great abundance and fully grown.

The five common species of Woodlice were seen, and one specimen was taken of *Trichoniscoides albidus*, being the second occasion on which this species has been obtained in Co. Down.

South of the light-house near the great dykes there are many fine rock-pools full of marine life; here some of the party spent some time collecting. The members reassembled at five o'clock in the Killough Hotel for tea, and the party returned to Belfast by the 6.47 train.

JANUARY 4, 1911.—ARCHÆOLOGICAL SECTION.—Alex. Milligen read a paper on "The Archæology of Surnames," Dr. Cunningham in the chair.

LIMERICK FIELD CLUB.

JANUARY 9.—ANNUAL MEETING.—The annual Meeting was held at the Club Rooms, Glentworth Street, the Rev. T. F. Abbott, B.D., President of the Club, in the chair. There was a large attendance.

Dr. George Fogerty then read the annual report, which contained the following :—

This is our 18th annual meeting, and we now number 118 ordinary members and four honorary members. During the past year sixteen new members have come amongst us. We have still plenty of room for more new-comers, especially for "workers." This lack of workers in the Club has always been put before the members, and your Committee would again appeal to you asking you to remember that the very existence of the Club depends to an enormous extent on those members who will come forward and take up some branch of scientific work. Regarding the finances of the Club your treasurer will tell us that in the year passed we have only just managed to balance our revenue and expenditure. With reference to our meetings during the year there were six lectures given, the average attendance at each being 44. Owing to various causes, principally the bad weather experienced during the summer months, it was found impossible to hold a single summer excursion, a matter which your committee greatly regret.

The Annual Meeting of last year was held on January 11, Rev. T. F. Abbott in the chair. After the necessary business of the annual meeting had been disposed of, an exhibition of lantern slides was given, the following members handing in contributions :—Mr. Barrington, Mr. Joseph Wallace, Mr. Kennedy, and Mr. A. Fitt. The first evening lecture was held on February 1st, when Mr. W. M. Sewell read a paper on the "Age of the Earth." Discussion followed the reading of the paper, Mr. H. V. Morony, Mr. Barrington, and Mr. Bennis taking part. For the second evening meeting held on 17th February, Mr. W. A. Green, of Belfast, lectured on "The People of the Dawn," a study of early inhabitants of the earth, their implements and mode of life. The third evening lecture was given on March 9th by Mr. Nevin H. Foster, President of the Belfast Field Club, who chose for his subject "The Feathered World." The fourth evening, April 1st, was occupied by an exhibition of lantern slides kindly lent by the proprietors of *Photography* and *Focus*. The fifth evening lecture was held on Monday, November 28th, when Mr. J. de W. Hinch gave a resumé of the work accomplished at the Conference of the Irish Field Clubs at Rosapenna, at which, owing to the distance, so few of our members were enabled to assist. The sixth and last evening meeting of the Club was held on December 12th, when Fr. O'Leary, S.J., Mungret College, lectured on "Earthquakes."

Mr. E. Bennis read the financial report, which was approved.

The following were elected officers of the Club for the year 1911 :—President, Rev. T. F. Abbott ; Vice-President, Mr. W. M. Sewell ; Secretary, Mr. H. Fogerty ; Treasurer, Mr. E. Bennis ; Committee, Mrs. Dodds, Miss Doyle, Rev. Fr. Kennedy, S.J. ; Dr. Geo. Fogerty, Mr. S. Ebrill, Mr. Benjamin Barrington.

R. A. PHILLIPS, of Cork, then read a paper on "Plants and Plant Preserving." A few years ago, he said, he lived in Limerick for about twelve months, and although his spare time was limited, he was much struck in the course of his rambles by the very interesting flora to be seen within a radius of five or six miles from the city. Castleconnell, Glenstal, and Adare revealed several rare plants, not previously known to exist in the county, and which proved to him that the natural history of the Limerick district had not been systematically investigated. Therefore it was that he selected the subject on which he addressed them that evening. The lecturer then proceeded to explain the method of preserving plants. Lovers of nature and members of Field Clubs most favoured the science of botany, and this was not to be wondered at, for the subject was full of interest. It was especially so in the topographical and geographical distribution of plants. Mr. Phillips pointed out how plants found in Cork and Kerry, and occasionally in Limerick, were to be met with in no other part of the British Isles, although they existed in profusion on the Pyrenees, the Spanish coast, and along the shores of the Mediterranean. He suggested the establishment in Limerick of a botanical class in connection with the Technical School. In Cork they had such a class for the past sixteen or twenty years and it had proved a great success.

IRISH FIELD CLUB UNION.

ACCOUNTS, 1910.

RECEIPTS.				EXPENSES.			
	£	s.	d.		£	s.	d.
To Balance,	15	5	7	A. W. Stelfox, attending Committee Meeting .	0	11	10
Affiliation Fees—				N. H. Foster, attending Committee Meeting, .	0	11	10
L.F.C., 1909,	0	15	8	N. H. Foster, lecture in Dublin and Limerick,	2	14	0
C.N.F.C., 1907 and 1908, .	0	10	0	J. de W. Hinch, lecture in Limerick, .	1	11	2
D.N.F.C., 1909,	1	0	10	Postages, 1906-1910, .	0	10	2
B.N.F.C., 1909-10, .	2	2	0	By balance,	21	8	3
Balance, Rosapenna Conference, .	7	13	2				
	£27	7	3		£27	7	3

Audited and found correct.

J. de W. HINCH.

R. LLOYD PRAEGER,
Hon. Sec. I.F.C.U.

NOTES.

BOTANY.

Catabrosa aquatica, var. *littoralis*.

In *Irish Naturalist*, 1902, p. 203, Mr. Praeger quotes me for "*Catabrosa aquatica*, var. *littoralis* Parnell = var. *minor* Bab." This is my mistake. The correct segnonomy is as follows:—

1. *C. aquatica*, var. *littoralis* Parnell, t. 102, 1842.

C. aquatica var. *littoralis* Kittel, Tasch. Flora Deutschlands, ed. ii. (1844), p. 102, ex Hackel.

(2 to 3 flowered).

2. *C. aquatica* β *uniflora* Gray, N. A. B. Pl., 1821, p. 133.

C. aquatica β *subtilis* Hook., Brit. Flora, ed. iv., 1838, p. 36.

C. aquatica β *minor* Bab., Man. Brit. Bot., ed. i., 1843, p. 266.
(1 flowered).

A. BENNETT.

Croydon.

ZOOLOGY.

Land Mollusca from North Antrim.

By request of Mr. W. Denison Roebuck, I have been collecting and forwarding to him Slugs from North Antrim. It may be worth while giving a list of the species found, as named by him:—*Arion ater* and var. *brunnea*, *A. subfuscus* and var. *cinereo-fusca*, *A. hortensis* (abundant), *A. circumscriptus*, *A. minimus* (rare); *Limax maximus*, and vars. *ferussaci*, *fasciata*, *cellaria*; *Limax cinereo-niger* var. *vera* (rare); *L. flavus* and var. *antiquorum*; *Agriolimax agrestis* and vars. *reticulata*, *rufescens*, *alba* (rare); *Milax sowerbyi*, *M. gagates* var. *rava*. Miss M. Fitzgerald of Oxford, and my sister, Miss G. E. O'Connor, were on Fair Head at the time I was collecting, and both being on the look-out for me for finds, Miss Fitzgerald found *Limax cinereo-niger*, var. *vera*, on grass, among heather, near a marshy place. This was the second record for the British Isles for this variety; it has since been found at Cork (*I. Nat.*, xvi., 370, 1907). With the exception of *A. minimus*, which we think was found up Glenshesk, the rest were mostly taken from our garden.

FRANCES S. O'CONNOR.

Ballycastle.

Ornithological Notes from Londonderry, 1910.

During the past year not much of importance has come under my notice, but the following notes may be of interest. As usual the autumn migration of Manx Shearwaters passed over our city, and Mr. E. M'Court obtained a specimen which alighted in a yard. On the 17th August last a specimen of the Wood Sandpiper (*Totanus glariola* Gmelin) was shot at Brenagh, Upper Lough Swilly, by Mr. G. B. Butler, R.M. On the 2nd November a cartman picked up a Fork-tailed Petrel (*Oceanodroma leucorhoa* (Vieillot) at Burt, Co. Donegal, about five miles from Derry. It was evidently driven inland by the strong gale from N.W. on the night of 1st November. The two following records I was not able to verify

personally, but I think the identifications were correct. Mr. John M'Connell, of Burt, reported to me that he had noticed the Whinchat (*Pratincola rubetra* Linn.) at Inch last autumn about the same place that Mr. Gibson found a nest in 1892. Mr. Samuel M'Candlas reported to me that he had seen a Flamingo shot at Inch about 12th November last. When I asked for a detailed description and a sketch, he described accurately, and drew the bill of a Spoonbill (*Platalea leucorodia* Linn). Unfortunately the bird was destroyed, but I have no doubt of the species.

Londonderry.

D. C. CAMPBELL.

GEOLOGY.

The Gortmore Cave.

Last September Mr. J. W. Puttrell of the Derbyshire Pennine Club, who was accompanied by Mr. J. W. Percival and the writer, took the temperature of the Vanishing Pool (see *J.N.*, xix., p. 151.) It was 50° (or 3° higher than the temperature of the water in Desmond's Cave). As the Blackwater showed a temperature of 60°, there is obviously no connecting siphon. The heavy rains of August apparently evaporated from the surface, as the pool contained less water than it did when first visited in June, but more than it contained on the second visit in that month. Two openings near the western extremity of the cliffs led to a large cavern containing rectangular chambers, one of which measured 100 feet square. This was apparently enlarged by falls from the roof, and contained very few stalactites. A clay slope led to a series of lower tunnels containing water and banks of silt. The cliffs show large traces of iron in places. In one spot the beds are considerably contorted and crushed into thin shale.

R. W. EVANS.

Doneraile.

Alleged Meteorite from Co. Down.

Mr. L. J. Spencer, A.R.C.Sc.I., of the British Museum (Natural History), informs me that the Bath Museum possesses a cut fragment of an iron meteorite, which came from the collection of Mr. Frederick Field. Mr. Field's note on the label is as follows:—"The accompanying specimen was bought by me of Patrick Doran, the celebrated Irish Mineral Collector. It was reported by the coastguard men that in August, 1834, a mass was seen to fall from the sky into the sea near Newcastle, Co. Down, Ireland. Some years afterwards Doran and his son took boat and coasted the neighbourhood for some miles—they found the mass on a ledge of rock, and my specimen was a piece taken from it."

The occurrence of this specimen would have been undoubtedly discussed by the late Dr. V. Ball in his paper on "Examples of meteoric falls in the Museums of Dublin," had he been aware of it, since he paid special attention to all records of Irish meteorites. The authority for its genuineness may not be so good as Mr. Field believed; but it would be very interesting to learn if similar fragments are found in other collections.

Dublin.

GRENVILLE A. J. COLE.

SOME NOTES ON IRISH SEALS.

BY R. F. SCHARFF, PH.D., M.R.I.A.

I HAVE recently had an opportunity of re-examining the skins and skulls of the Irish seals contained in the National Museum of Ireland, and I herewith give some of the results, which may be of interest to the readers of the *Irish Naturalist*.

Externally the different kinds of seals inhabiting the Irish seas are very much like one another, and no very striking characters seem to separate them. Moreover few naturalists ever get an opportunity of observing seals in their natural habitat, so that our knowledge of them is practically limited to the skins and skulls contained in museums and the few living specimens which find their way to our Zoological Gardens. The late Dr. Robert Ball¹ remarked that the Grey Seal may be readily distinguished from the Common Seal by its fierce mien, but I have failed to recognise that character among the seals that have been kept in confinement from time to time in the Dublin Zoological Gardens. It is probable that the character he noticed was due to the powerful cluster of bristles—a kind of beard—which the Grey Seal develops in old age. Even in young specimens of the Grey Seal, when they are about the size of full-grown Common Seals, these bristles on each side of the nostril are very perceptibly thicker than in the other species, and the finer ones are darker in colour. But that after all is not much to distinguish a species by, when it is some distance off and only occasionally lifts its head above the water.

That the Grey Seal attains a much greater size than the Common Seal is a more useful distinguishing character. Any seal of a length of six feet or more is almost sure to be a Grey Seal, for the latter grows to a length of nearly ten feet, while the Common Seal never exceeds half that size. Another still more striking feature is found in the young Grey Seal. All seals, as far as we know, possess at birth

¹ Ball, R., "Remarks on the Species of Seals inhabiting the Irish Seas."—*Trans. R. Irish Academy*, vol. xviii., 1835–38.

a thick woolly coat of perfectly white fur, and apparently that coat is not usually shed until the cub takes to the water. Now in the Common Seal this coat seems to be shed at birth or even before, while in the Grey Seal the white fur remains for a month or more. We have kept young Grey Seals in the Dublin Zoological Gardens in their white coats until they were nearly four feet in length, and they are thus very easily distinguished from the Common Seal of the same size.

The term *Common Seal*, I may mention, is a misnomer as far as Ireland is concerned, for the common Irish seal is certainly the Grey Seal (*Halichoerus grypus*). Among the seventeen Irish seal skulls that have been collected from such specimens as were accidentally killed round the coast, twelve belong to the Grey Seal and five only to the Common Seal (*Phoca vitulina*). Whether this represents actually the true proportion of seals of the two species, we cannot determine, but I think there can be no doubt that the great majority of seals caught in fishermen's nets off the Irish coast are Grey Seals.

From the above remarks it may be inferred that as yet we are unable to discriminate between the two species from the colour or structure of the fur. As a rule the Grey Seal has a dark grey fur, while it is often yellowish-grey in the other species, but both are subject to great variation in colour. Yet we possess a valuable distinguishing character in the skull and teeth. Anyone examining the cheek-teeth can readily tell the Grey Seal from the Common Seal by the simple heavy conical teeth characterising the former species, while the latter has composite teeth with several cusps resembling little combs. But here we are confronted with a further difficulty, for the Bearded Seal, the Harp Seal and the Ringed Seal have all composite teeth like the Common Seal. Moreover the two former are said to have been noticed off the west coast of Ireland, although there is no definite evidence that they do inhabit Irish waters.

Now it is of interest that among the skins and skulls in the Irish National Museum collections there is one skin, and a skull belonging to it, which are identical with the Ringed

Seal (*Phoca foetida*). According to Mr. Lydekker¹ this species has only twice been observed off the coasts of the British Islands, once on the Norfolk coast in 1846, and again on the Lincolnshire coast in 1889. The Irish specimen was taken alive in Galway Bay in 1895 and lived in the Dublin Zoological Gardens for some time without any one suspecting that we possessed an example of this rare seal, which is a native of the coast of Greenland, Labrador and the Arctic Ocean. In its shape there is really little to distinguish it from the Common Seal. The fact that the Ringed Seal has somewhat longer limbs and tail, narrower head and more pointed snout is not readily noticeable. Nor can anyone be expected to observe at a glance that the inner or first claw of the forelimb is a little longer than the other claws, while in the Common and in the Grey Seal it is a trifle shorter than the second. The claws of the Ringed Seal are straight and somewhat flattened from above downward. In the Common and Grey Seals they are compressed laterally and slightly curved.

The newly-born Ringed Seal possesses the white coat like the others and is said to retain it for a month.² This would therefore form a ready feature of distinction between the two species. But what is the most striking external character is the colour of the fur. In the water it would not be readily noticeable, but in the dry state the fur shows that there are a number of light oval rings surrounding darker spaces. When the fur is touched we notice another difference. The fur of the Ringed Seal feels harsh, and it seems that this harshness is due to the fact of the fur being composed of two qualities of hair, of thick straight hairs and thinner slightly curved ones, while in the soft fur of the Common Seal the hair is all of the same density. The total length of the adult Ringed Seal is about the same as that of the Common Seal, from four to five feet.

The skull of the Ringed Seal differs in several important respects from that of the Common Seal. The partition between the eye-sockets is much thinner in the former, and the premaxillary bones run to and touch the nasal bones, whereas they do not touch the nasal bones in the Common Seal. If we turn over the skull and look at the lower

¹ Lydekker, R., "Handbook of British Mammalia," London, 1895.

Allen, J. A., "North American Pinnipeds," Washington, 1880.

surface, we note that the series of cheek-teeth in the Ringed Seal are small and delicate in shape, and they are arranged with their long axes in a straight line. In the Common Seal these teeth are of a more massive type and placed in a slanting position, their long axes being parallel to one another. In front of the posterior suture of the maxillary bones there are two little holes or foramina, one on each side, in the Common Seal. In the Ringed Seal these foramina lie behind the suture on the palatine bones.

National Museum, Dublin.

THE IRISH DIPPER, JAY, AND COAL-TITMOUSE.

BY A. R. NICHOLS, M.A., M.R.I.A.

A RECENT examination by experienced ornithologists in England of a large number of specimens of the Dipper, Jay and Coal-Titmouse has shown that the Irish forms of these three birds are distinct from the British.

That there were slight differences in coloration between Irish and British specimens of the Dipper and the Jay had been known for a long time, for Dresser¹ had remarked that the single Dipper from Ireland in his collection was not the British Dipper, but agreed closely with specimens from Sweden; and as regards the Jay the following statement appeared in the second edition of A. G. More's "List of Irish Birds," published in 1890 by the Dublin Museum;—"Mr. E. Williams has noticed that the Irish Jay is of a warmer and richer colour than the English bird."

Dr. E. Hartert, who has examined the Dippers, regards the Irish Dipper as a distinct sub-species which he has named² *Cinclus cinclus hibernicus*. He states that Irish Dippers have "wider black borders to the feathers of the upper side" than British Dippers, "so that the back appears almost uniform black in freshly moulted examples, and the rufous pectoral area is more restricted" than in British Dippers, but wider than in typical Scandinavian Dippers. Specimens of the Irish Dipper are in the Dublin Museum from Counties Down, Dublin, and Tipperary.

¹ "A History of the Birds of Europe," vol. ii., 1874.

² "Die Vögel der palaarktischen Fauna," 1910, p. 790, and *British Birds*, October, 1910, p. 136.

As the result of an examination of a considerable number of British and Irish Jays by Mr. H. F. Witherby and Dr. E. Hartert, the Irish Jay has also recently been described as a distinct sub-species, and named by them *Garrulus glandarius hibernicus* (*British Birds*, January, 1911, pp. 234-5). The most striking characteristics of the Irish Jay are "the dark rufous colouring of the sides of the head, ear-coverts and underparts, and the darker crest"; the measurements of the wing and bill are said to be "perhaps slightly smaller on the average" than those of the British Jay. Specimens of the Irish Jay are in the Dublin Museum from Counties Kildare, Meath, Tipperary, Waterford, and Wexford.

At the meeting of the British Ornithologists' Club held December 14th, 1910, Mr. W. R. Ogilvie-Grant exhibited and described examples of a Titmouse from Ireland which he regards as "an extremely distinct and well-marked species" and has named¹ *Parus hibernicus*. He remarked that "the pale mustard-colour of the patches on the sides of the head and occipital spot, as well as of the breast and belly, also the clear cinnamon-coloured sides, flanks, and upper tail-coverts, rendered *P. hibernicus* distinguishable at a glance from *P. britannicus*," the British Coal-Titmouse. There are in the Dublin Museum specimens of the Irish Coal-Titmouse from Athlone and the Counties Dublin, Waterford, and Wexford; these specimens were obtained several years ago, and the light patches on the sides of the head, occiput, and underparts now show only a faint trace of the mustard-yellow colour stated by Mr. Ogilvie-Grant to be very bright and conspicuous in freshly killed examples, but to fade considerably a few days after death.

Mr. Ogilvie-Grant mentioned that the British Coal-Titmouse also occurred in Ireland, and that he had himself obtained a number of specimens at Clondeboy, Co. Down, in January, 1904, but "was not aware whether these birds bred in Co. Down or were merely winter migrants from the opposite coast of Britain."

National Museum, Dublin.

¹ *Bulletin of the British Ornithologists' Club*, No. clxv., December 31st, 1910.

NOTES ON NON-MARINE MOLLUSCA FROM SOME IRISH LAKES,

OBTAINED BY MAJOR H. TREVELYAN.

BY A. S. KENNARD, F.G.S., AND B. B. WOODWARD, F.L.S.

It is, alas ! only too true that the molluscan fauna of many of the smaller Irish lakes is practically unknown. R. A. Phillips, Dr. Scharff, A. W. Stelfox, and R. Welch have added greatly to our knowledge, but the number of these smaller lakes is so large that it will be many years before our information will be satisfactory.

Difficulty of access is also an important factor, and this is more painfully appreciated in the field than it is by an examination of maps. It was, therefore, a matter of congratulation to us when Major H. Trevelyan volunteered to undertake the examination of some of these lakelets by dredging, and to forward to us for examination the fresh-water mollusca. We would here place on record our deep obligation to this enthusiastic investigator, who spared no trouble, and often had his boat carried many miles by cart to reach some desired locality. We have not given the depths at which the shells occurred, since they were all taken in shallow water. We are indebted to E. W. Howell and A. W. Stelfox for kind assistance.

LOUGH TULLYNASIDDAGH, EAST DONEGAL.

Limnæa prætexnis, Howell.

palustris (Müll.).

Physa fontinalis (Linn.).

Bithynia tentaculata (Linn.).

Valvata piscinalis (Müll.).

Sphaerium cornutum (Linn.).

Pisidium Steenbuchii (Möll.).

LOUGH SCOLBAN, FERMANAGH.

Planorbis albus, Müll.

Bithynia tentaculata (Linn.).

LOUGH ACAPPLE, EAST DONEGAL.

Limnæa prætexnis, Howell.

Bithynia tentaculata (Linn.).

Pisidium subtruncatum, Malm.

obtusale (Lamk.).

Pisidium milium Held, [= *gassiesianum*, Dupuy].

pusillum (Gmel.) Jenyns.

Steenbuchii (Möll.).

LOUGH ADEERY, EAST DONEGAL.

Pisidium nitidum, Jenyns.

LOUGH SHIVNAGH, EAST DONEGAL.

<i>Limnæa palustris</i> (Müll.).	<i>Pisidium obtusale</i> (Lamk.).
<i>Bithynia tentaculata</i> (Linn.).	<i>pusillum</i> (Gmel.) Jenyns.
<i>Pisidium pulchellum</i> , Jenyns.	<i>Steenbuchii</i> (Möll).

LOUGH DERG, EAST DONEGAL.

<i>Limnæa prætenuis</i> , Bowell.	<i>Pisidium pusillum</i> (Gmel.) Jenyns.
<i>palustris</i> (Müll.).	<i>Steenbuchii</i> (Möll.).
<i>Ancylus fluviatilis</i> (Müll.).	

LOUGH VEARTY, FERMANAGH AND EAST DONEGAL.

This is a shallow lake, its depth, perhaps, not exceeding 12 feet.

<i>Ancylus fluviatilis</i> (Müll.).	<i>Bithynia tentaculata</i> (Linn.).
<i>Limnæa prætenuis</i> , Bowell.	<i>Sphærium corneum</i> (Linn.).
<i>palustris</i> (Müll.).	<i>Pisidium subtruncatum</i> , Malm.
<i>Planorbis albus</i> , Müll.	<i>nitidum</i> , Jenyns.
<i>Physa fontinalis</i> (Linn.).	<i>Steenbuchii</i> (Möll.).
<i>Valvata piscinalis</i> (Müll.).	<i>obtusale</i> (Lamk.).

LOUGH ROSHIN, EAST DONEGAL.

This is situate about $3\frac{1}{4}$ miles north of Belleek. It is deep in parts; quite near the shore it is 12 feet, and in the centre 40 to 50 feet.

<i>Succinea elegans</i> , Risso.	<i>Pisidium subtruncatum</i> , Malm.
<i>Bithynia tentaculata</i> (Linn.).	<i>pulchellum</i> Jenyns.
<i>Sphærium corneum</i> (Linn.).	

The first-named species was obtained in the dredge. In this lake Major Trevelyan obtained a large number of dead shells from one spot at a depth of 10-12 feet. The species present were :—

<i>Limnæa pereger</i> (Müll.).	<i>Bithynia tentaculata</i> (Linn.).
<i>stagnalis</i> (Linn.).	<i>Valvata piscinalis</i> (Müll.).
<i>Planorbis carinatus</i> , Müll.	<i>Sphærium corneum</i> (Linn.).
<i>albus</i> , Müll.	

It is noteworthy that although Major Trevelyan dredged in various parts of this lake, yet there are five species amongst the dead shells which he failed to find alive.

It can thus be seen how difficult it is to obtain an accurate knowledge of the fauna of these small lakes.

LOUGH DRUMGOON, FERMANAGH.

Bithynia tentaculata (Linn.).

LOWER LOUGH ERNE, FERMANAGH.

<i>Limnæa peregr</i> (Müll.).	<i>Bithynia tentaculata</i> (Linn.).
<i>stagnalis</i> (Linn.).	" Dredged 3 feet," " Below
<i>Ancylus fluviatilis</i> , Müll. " Rossbeg	Thompson's," " Bleanamora
Point."	Bay."
<i>Physa fontinalis</i> (Linn.). " Rossbeg	<i>Valvata piscinalis</i> (Müll.). " Shore."
Point," " Below Thompson's."	" Dredged 3 feet," " Bleana-
<i>Planorbis vortex</i> (Linn.). " Shore "	mora Bay."
(dead). " Bleanahey Bay near	<i>Paludetrina Jenkinsi</i> , Smith,
Castlecaldwell station " (dead).	" Dredged 3 feet."
<i>Planorbis carinatus</i> , Müll. " Ross-	<i>Sphærium corneum</i> (Linn.),
beg Point," " Shore," " Blean-	" Shore," " Dredged 3 feet,"
amora Bay, " " Below Thomp-	" Bleanamora Bay."
son's."	<i>Pisidium amnicum</i> (Müll.).

Besides the shells obtained by dredging Major Trevelyan also sent a small number of land shells, which it is advisable to place on record.

"FROM THE WALLS OF CASTLECALDWELL," FERMANAGH.

<i>Vitrea hibernica</i> , Kenn.	<i>Cochlicopa lubrica</i> (Müll.).
<i>Pyramidula rotundata</i> (Müll.).	<i>Clausilia bidentata</i> (Ström.).
<i>Hygromia rufescens</i> (Penn.).	<i>Jaminia cylindracea</i> (Da Costa).

"FROM AN ISLAND IN LOUGH ERNE," FERMANAGH.

<i>Vitrea nitidula</i> (Drap.).	<i>Balça perversa</i> (Linn.).
<i>radiatula</i> (Ald.).	<i>Jaminia cylindracea</i> (Da Costa).
<i>Zonitoides nitidus</i> (Müll.).	<i>Succinea elegans</i> , Risso.

"FROM SHORES OF LOUGH ERNE," FERMANAGH.

Vitrea crystallina (Müll.).*Helix nemoralis*, Linn.*radiatula* (Ald.).*Cochlicopa lubrica* (Müll.).*Zonitoides nitidus* (Müll.).*Jamnia cylindracea* (Da Costa.).*Euconulus fulvus* (Müll.).*Clausilia bidentata* (Ström.).*Pyramidula rotundata* (Müll.).*Succinea elegans*, Risso.

NOTES ON THE SPECIES.

Limnæa stagnalis (Linn.).—The examples of this species from Lower Lough Erne are interesting and differ markedly from the type, and would be termed *L. Contagnei*, Loc. by French authors, but in our opinion it is only a mutation caused by environment. Several of the shells are noteworthy in possessing a change of colour on the last whorl. The shell is normal in colour except for a band about 12 mm. wide which extends right across the body whorl. Here there are numerous white lines parallel with the suture, and this band is succeeded by shell of the normal colour, thus clearly showing that it is not a mere individual mutation, but arises from some extraneous cause which only acted for a limited period.

Limnæa pereger (Müll.).—There is not much variation in the examples of this species except, perhaps, in the height of the spire. One or two specimens from Lower Lough Erne approached the form from Lough Neagh which is usually called var. *lacustris*, Leach (an anatomical examination of the Lough Neagh shells is greatly to be desired). All the examples are small, the largest measuring 17 by 13 mm. There is a total absence of inflated forms.

Limnæa prætenuis, Bowell.—It is a matter of congratulation that through the labours of Major Trevelyan we have been able to examine several series of this species. Originally described from Lough Nagarriva, South Kerry, we can now add *L. Acapple*, *L. Derg*, and *L. Vearty*, examples from these three lakes having been examined anatomically by Mr. Bowell, and on conchological grounds we have referred the shells from *L. Tullynasiddagh* to this species. It is extremely probable that it has a wide range in Ireland, and judging from material in the British Museum (Natural History) it, or a closely allied species, occurs in the Faröes. The species varies somewhat in the height of the spire, those from the original locality possessing a very short spire, whilst the examples from *L. Acapple* and a few from *L. Vearty* have this character more pronounced. It would appear from the *L. Vearty* specimens that there is some variation in the inflation of the last whorl, for in some of these examples the last whorl is inflated and the spire is quite hidden, the shell resembling a *Bulla* and being markedly different from any other form of European *Limnæa* we are acquainted with.

Limnæa palustris (Müll.).—The examples of this species, whether from Lower Lough Erne or the smaller lakes, all present the same facies. They are decidedly small, some are much eroded and slightly decollated and represent the form called by French authors *L. fusca*, Pfr.

Planorbis carinatus, Müll.—The few individuals of this species are not typical. They are very much compressed, and the striæ are much more pronounced. It is a form which is not uncommon in Ireland, though, according to our experience, it is absent from England.

Planorbis vortex (Linn.).—The representatives of this species agree with the *P. compressus*, Mich., of French authors.

Ancylus fluviatilis, Müll.—Two forms of this species are present, those from L. Vearty and L. Derg being only half the size of the examples from Lower Lough Erne. The occurrence of these two forms was pointed out over fifty years ago by W. Thompson, and we are still unable to say whether there are two species or whether the difference arises from environment.

Physa fontinalis (Linn.).—Of this also two forms are represented, a large form, *P. Taslei*, Bourg., and a smaller form, *P. Coronadoi*, Servain; but as yet no valid reasons have been adduced in support of the view that the *P. fontinalis* (Linn.) of English authors should be considered an aggregate species.

It is of course possible that it is an aggregate, yet, when one considers the great variation of some species of this genus, one may well hesitate in accepting this view, on the ground of small differences in the shape of the shell.

Valvata piscinalis (Müll.).—All the examples of *V. piscinalis* would be named *V. alpestris*, Blauner, by most Continental authorities, but we are in agreement with Dr. Bollinger in considering this so-called species as only a mutation of *V. piscinalis*. (Zur Gastropodenfauna von Basel und Umgebung. Basel, 1909, p. 165). We would, however, point out that in these islands this form has a decidedly western range.

Bithynia tentaculata (Linn.).—Many of the examples are much eroded at the apex and decollated, this being most pronounced in the shells from L. Vearty and L. Shinnagh. The shells from the smaller lakes are decidedly smaller in size than those from Lower L. Erne. The largest example from the last-named lake measures 13.9 by 8.5 mm. and approaches the var. *producta* Menke of Continental authors, whilst from the smaller lakes none exceeds 11 mm. in length.

Sphaerium corneum (Linn.).—All the examples of this species are small, being much smaller than those found in the south-east of England. At the same time there is but little difference in size between the shells from Lower Lough Erne and those from the smaller lakes. Some of the examples from Lough Vearty and Lough Tullynasiddagh are small but very much inflated, some examples measuring 7 by 6 by 5.5 mm., presenting a very different appearance from typical *corneum*. Since, however, this species varies greatly in inflation, and the extreme examples can be graded into normal *corneum*, we have come to the conclusion that it is a local mutation arising from environment, and in this view we have the support of A. W. Stelfox and R. Welch, M.R.I.A.

Pisidium.—The members of this genus were, on the whole, poorly represented; at no spot were many individuals taken, frequently only one or two. The greatest number of species were found in L. Acapple, L. Shinnagh, and L. Derg.

P. amnicum was represented by a single small specimen from Lower Lough Erne.

P. henslowanum, *P. casertanum* and *P. personatum*, which might have been expected, especially the two last-named, have so far not been obtained by Major Trevelyan. Even the prevalent Irish form, *P. pusillum*, was only met with in Loughs Acapple, Shivenagh, and Derg.

The most interesting point in relation to this genus is the further confirmation of the widespread existence in north-west Ireland of *P. Steenbuchii*. It was found in Loughs Acapple, Shivenagh, Derg, Vearty, and Tullynasiddagh. Although we had long met with the form throughout the British post-Pliocene deposits it was less than fifteen months ago that the first living specimens were obtained by Mr. F. F. Laidlaw from Lochan-a-Chait, Perthshire. It was next recognised among specimens from the Lake District, and then from places as widely apart as Achill Island and Lincolnshire. The Scotch and Irish examples seem to belong to the orbicular form, whilst the Lincolnshire specimens are of the most ovate type.

Although Major Trevelyan had his boat transported by road some thirteen or more miles to Lough Aguse, he was not fortunate enough to obtain thence further specimens of *P. Lilljeborgii*, which A. W. Stelfox took there in 1909. Since Major Trevelyan intends to renew his researches in the coming summer, it is not too much to hope that he will make further important discoveries, and that his name will be as honoured by students of malacology as it already is by students of ichthyology.

REVIEWS.

WORMS FROM BRITISH AND IRISH SEAS.

A Monograph of the British Annelida. By W. C. McINTOSH, M.D., F.R.S., &c. Vol. ii., Part ii. 4to, pp. 233-524. Plates li.-lvi. coloured, and lxxi.-lxxxvii., uncoloured. London (Ray Society), 1910.

The latest part of Professor McIntosh's elaborate work on the British Annelids, or marine bristle-worms, has succeeded its predecessor after so short an interval, comparatively speaking, that hopes are roused of the early completion of this valuable Monograph. The present volume deals with the families Nereidae, Eunicidae, Goniadidae, Glyceridae, Ariciidae, and a number of Syllidae which have been added to the British fauna by Major Elwes since the publication of the last part of the Monograph. There are six coloured and seventeen uncoloured plates. It is rather unfortunate that some of the plates illustrating species described in the present part are included in the preceding volume, and *vice versa*, and consequently the plates are not numbered consecutively. The coloured figures are beautifully executed, that of *Staurocephalus rubrovittatus* on Plate lv. being probably the least satisfactory. The

Irish specimens of this species, at any rate, are more brightly coloured. The descriptions of the species are very full, and the comparisons with closely related species not found in the British area are especially valuable.

The weakest part of the work is undoubtedly that dealing with distribution, especially the extra-British portion. A number of localities are capriciously selected for mention, and the rest ignored. For instance, one might infer from the description of *Aricia Latreillii* on p. 502, that it had been found only at St. Andrew's and the Firth of Forth. Apparently this subject is not so important in Professor McIntosh's eyes as in those of most Irish biologists. Recently¹ Professor McIntosh published a list of the Irish localities of the species described in this volume. In this list is the name of a new species, *Aricia Buskii*, but there is no mention of it in the Monograph. It is very desirable that this *nomen nudum* should be quickly supplemented by an account of the structure and specific characters of this species. Professor McIntosh is guilty of the heinous nomenclatural crime of describing as new in this volume, species which he described some years ago in the *Annals and Magazine of Natural History*.

Under *Autolytus inermis* (p. 247) there is no mention of the fact that this species was separated as the type of a new genus *Autolytides* by Malaquin.² It is distinguished from all other species of the genus *Autolytus* by having a proboscis devoid of teeth.

Of special interest to Irish zoologists is the species which McIntosh records as *Eunice floridana*, Pourtales. This worm is always found associated with the branching coral *Lophohelia prolifera*, or a species of *Amphihelia*, and is abundant in deep water off the west coast of Ireland. The worms live in a parchment-like tube which usually perforates a branch of the coral. It seems more probable that the coral grows up round the tube than that the worm bores into the coral, as the free ends of the worm-tube generally project beyond the coral. This species was described as new, under the name *Eunice philocorallia*, by Miss F. Buchanan,³ who pointed out its close resemblance to *E. floridana*. Shortly afterwards⁴ she published a note stating that the species appeared to be identical with one previously described by Storm as *E. Gunneri*. Professor McIntosh omits any reference to this revised opinion and does not mention *E. Gunneri*.

In this volume, three species are described which occur on the west of Ireland, but nowhere else in the British marine area. These are *Lumbriconereis hibernica*, McIntosh; *Eunice floridana*, Pourtales; and *Onuphis fragosa*, Ehlers.

R. SOUTHERN.

¹ *Irish Naturalist*, vol. xix., 1910, p. 95.

² *Recherches sur les Syllidiens*, p. 76.

³ *Sci. Proc. R. Dublin Soc.*, viii., p. 173.

⁴ *Tom. cit.*, p. 432.

AGRICULTURAL GEOLOGY.

The Geological Features and Soils of the Agricultural Station of the Department of Agriculture at Ballyhaise in the County of Cavan.
By J. R. KILROE, A.R.C.Sc.I.; H. J. SEYMOUR, B.A., F.G.S.;
and T. HALLISSY, B.A. Pp. 50 (with coloured map). Dublin: H. M.
Stationery Office, 1910. Price, 1s. 6d.

This memoir published by the Department of Agriculture is not so much a new departure as a following up of the line pursued in the memoirs of the Dublin, Belfast, Cork, Limerick and Londonderry districts, where the soils commanded a degree of consideration.

Chapter I. is occupied with a description of the general features of the station. The farm of 874 acres, has 653 acres arable, 147 occupied by woods, and 44 by peat, whilst the remaining 30 are covered by the river Annalee, which passes through them in a meandering course. This river supplies power for driving mills and dairy machinery at a point east of Ballyhaise House. In Chapter II. Mr. Kilroe deals with the solid geology. Two formations, the Ordovician, consisting of fine-grained sandstones, and the Carboniferous, which occurs $1\frac{1}{2}$ miles N.E. of the village of Ballyhaise, are discussed.

Professor Seymour gives a very interesting chapter on surface-deposits, and deals with the question of the origin of drumlins, those curious elongated mounds which can hardly have been produced by any process of weathering with which we are familiar. He states that "it is fairly certain that the shape of the drumlins is original and is connected with the movement of the ice-sheet at the time of its maximum development. The probability is that a certain condition of the rock-floor such as the presence of hummocks obstructing the sole of the glaciers, has had something to do with the phenomenon, for many of the more typical drumlins have a rock-core masked beneath a mantle of boulder-clay. Their formation would appear also to be connected with divergent movements of the ice-sheet locally, such divergence being primarily due to the presence of rock-obstructions which led to the accumulation of boulder-clay in certain places. The continued movement of the ice-sheet caused it ultimately to over-ride the mass and give it its present characteristic shape." Plates I. and III. give a good idea of the shape of these drumlins, while the other, Plate II., shows a strong contrast between the vegetation on the drift and the coarser kind on the bare ground. It is interesting to note how the alluvial deposits arrange themselves into two distinct types—a loam forming a bank, in one place six feet high, by the sides of the stream, while the less heavy mud was carried further over the flooded meadows.

Mr. Kilroe, in Chapter IV., gives an account of the origin of the soils, and in Chapter V. discusses the properties of these that most affect agriculture. Water capacity or "minimum water capacity," *i.e.*, that left in a soil which is properly drained, as a film, is found to depend upon size of soil particles, increasing with their minuteness. The amount of the fine material governs percolation, for though the percentage of gravel may be great, yet this finest material may act as a clay and impede both percolation and also the passage of air.

Capillarity, on the other hand, increases with the decrease of size of particles till .02 mm. is reached, but when the particles are finer than this the rise of water is very slow, though eventually reaching a high level in these fine soils.

The effect of aspect on heating power is clearly shown by three diagrams. The physical and chemical characters of the Ballyhaise soils have been carefully investigated by Mr. Hallissy, who is responsible for the detailed account in Chapter VI. Nine soil types were established, ranging from sand containing less than ten per cent. of .01 mm.-sized particles in the fine-earths to clay which contains over fifty per cent. The soil-types having been established, the boundaries of each type were then distinguished in the field. In doing this, borings with a soil-auger were made at intervals, whilst the character of the vegetation, which varied with the soils, was also an effective help.

This memoir must be of considerable value to all those who are anxious to cultivate their farms in accordance with scientific methods.

L. SWAIN.

NOTES.

Contents of Pheasant's and Wood-pigeon's Crops.

I have recently examined the contents of the crops of a Pheasant and a Wood-pigeon, and it may not be uninteresting to readers of the *Irish Naturalist* to learn of what they consisted. The former bird was shot in Co. Tyrone in November last, and in its crop were found considerable quantities of the fleshy roots of the Lesser Celandine (*Ranunculus Ficaria* L.), together with large numbers of seeds of the Wild Hyacinth or Bluebell (*Endymion non-scriptum* Garcke). A few scraps of blackberry leaves, together with several seeds of two undetermined species of *Carex* and one seed of *Potentilla reptans* L. completed the list of contents of the crop of this bird. The Wood-pigeon was shot in Co. Cavan in December last, and its crop contained very large numbers of the seeds of Corn Spurrey (*Spergula arvensis* L.) as well as short pieces of roots of a plant which I was not able to identify from anatomical characters. The pieces, however, were planted in a pot of soil in a warm greenhouse and all of them grew and produced the leaves of Silverweed (*Potentilla Anserina* L.). The crop contained two masses, each nearly the size of a walnut, of ground-up material resembling dry dough, in the outer layers of which the remains of the Spurrey seeds could be identified. It is quite evident that these seeds therefore were being destroyed, and although the Wood-pigeon is frequently and probably rightly looked upon as the farmer's enemy, in this particular instance the bird was performing a distinctly friendly act by destroying the seeds of one noxious weed and the roots, stored with plenty of reserve material, of a second. Some of my friends inform me that the roots of Silverweed are not uncommonly eaten by children in the North of Ireland, where they are known as "mashie corn."

G. H. PETHYBRIDGE.

Royal College of Science, Dublin.

Quedius obliteratus from Co. Cavan.

Mr. Keys has pointed out (*Ent. Mo. Mag.* 1902, p. 147) that Wollaston records *Quedius obliteratus*, Er. from Rosnalie, Kanturk, Co. Cork (*Zoologist* 1847, p. 1576). This species, which seems to be very local in England, has, to the best of my knowledge, not been found in Ireland since. It was, therefore, with much pleasure that I took a specimen in the yard at Cloverhill, Co. Cavan, on September 30, 1910, from under the bark of an old log which is used as a support for the haystacks. On my return to this log on the following day, I found that it had been covered with several tons of hay, and was, therefore, no longer available. No other specimens could be found in any of the other pieces of timber that were lying about, nor at the bottom of the haystacks.

135 Elm Park Mansions, London, S.W.

G. W. NICHOLSON.

Coleoptera from South Kerry.

The following list of some of the more interesting beetles captured by me last August in South Kerry, chiefly in the Caragh Lake and Glencar districts, may be worth recording :—

Cychrus rostratus, *Carabus catenulatus*, *Leistus montanus*, *Nebria Gyllenhalii*, on Caher and Carrantnohill; *Bradycellus distinctus*, Glencar; *Trechus rubens*, one example under fir-bark near Blackstones Bridge, Glencar; *Patrobis assimilis*, common on the Reeks above 2,000 feet; *Pogonus chalcus*, Rossbeigh; *Lathrobium multipunctum*, *Oxytelus complanatus*,* Glencar; *Necrophorus mortuorum*, *N. ruspator* var. *microcephalus*,* *Necrodes littoralis*, all three occurred in a dead rat, Glencar; *Onthophagus fracticornis* in profusion in *stercore* on Rossbeigh sandhills; *Aphodius rufescens*,* *A. scybalarius*, *A. nitidulus*, *A. putridus* * (*borealis*) on Rossbeigh sandhills in *stercore*; *Cryptohypnus iv-guttatus* on shore of L. Acoose; *Strangalia armata*, one specimen in Lickeen woods, Glencar; *Otiorhynchus muscorum*,* Rossbeigh common. The species marked with an asterisk are new to Kerry. I am greatly indebted to Messrs. W. F. Johnson and J. N. Halbert for kindly naming for me many of the above.

L. H. BONAPARTE WYSE.

Ealing Common, London, W.

Former Occurrence of the Wild Cat in Ireland.

In his paper published in the *Proc. Roy. I. Acad.*, vol. xxvi., B. 1, page 1, in which he described the bones of Wild Cats from the caves of County Clare, Dr. Scharff stated that the Wild Cat is mentioned in an ancient Irish poem. By itself this would not be conclusive evidence, but it is interesting to find that there are other allusions to the occurrence of a Wild Cat in Ireland in historical times. These are so authentic that I cannot think the fact can be any longer in doubt. I do not propose to publish these now, as I am collecting them for my forthcoming book on British Mammals. They are, however, available for anyone who reads the current books on Irish history.

G. E. H. BARRETT HAMILTON.

Kilmanock, Co. Wexford.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

JANUARY 31.—THE ANNUAL GENERAL MEETING was held at Leinster House, the Right Hon. JONATHAN HOGG (President) in the chair. The Hon. Secretary, Dr. R. F. SCHARFF, read and moved the adoption of the Council's Report for 1910.

During the years 1909 and 1910 the number of visitors to the Society's Gardens, and the receipts at the Entrance Gate, were as follows:—

		1909.				1910.			
		Admission.	Receipts.			Admission.	Receipts.		
Members	..	16,119	—			14,401	—		
Public Institutions		1,220	—			2,201	—		
Members' Tickets		263	—			208	—		
			£	s.	d.		£	s.	d.
Visitors at 1s.	..	11,410	570	10	0	11,035	551	15	0
Do.	., 6d. ..	29,566	739	3	0	31,268	781	14	0
Do.	., 3d. ..	10,352	129	7	9	9,860	123	5	0
Do.	., 2d. ..	76,232	635	5	4	71,201	593	6	10
Do.	., 1d. ..	40,596	169	3	0	42,913	178	16	1
Garden Parties and Schools	..	—	2	0	0	—	—		
		185,758	£2,245	9	1	183,087	£2,228	16	11

The receipts for 1910 are less than for any year since 1901, and the number of visitors, both in 1901 and 1904, was less than in 1910.

The figures for last year are rather instructive. The weather was most unfavourable, and this certainly must have prevented large numbers from availing themselves of the attractions of the Gardens. It also affected the visits of the members of the Society, who enter, of course, free of charge. The takings from Sunday admissions too have fallen, and yet the total receipts at gate during the past year are only slightly less than they were in 1909, in spite of many holidays being utterly spoiled by heavy winds and rain. A great increase has taken place among the sixpenny visitors—mostly excursion parties from the country—and it is a good sign also that the poor children have not been prevented by the weather from enjoying the Gardens on Sundays, since 2,000 more were there than in the year before.

The receipts from entrance fees and subscriptions to the Society are lower than last year. They are not so low when we compare them with the average of the last ten years, but the Council think that the Zoological Gardens are of such distinct advantage to the City of Dublin and the country at large, that more persons should avail themselves of the opportunity of aiding this National Institution by becoming Members of it. It is satisfactory to record that nineteen became Life Members of the Society during the past year.

ADMINISTRATION.

Five years ago the Right Honorable Jonathan Hogg was invited to accept the responsibilities of the Presidency. As the Society's rules provide that the same person shall not be President for more than five years in succession, he now retires, but the Council cannot allow his period of office to terminate without expressing their deep obligation to him for his many and valued services. For twelve years before he became President he acted as Honorary Treasurer, and during this time he placed the Society on a sounder financial basis than it had ever been. By his tact, geniality and devoted interest in the affairs of the Society he has done much to promote the success of the Society and that of its gardens.

The Council have great pleasure in proposing that this important office of President shall be filled by Sir Charles Ball. Not only has he been many years on the Council, but he has always evinced an exceptional interest in the welfare of the animals and the Gardens. This was not the only reason for his selection. Almost since the Society's foundation, some members of his family have been more or less intimately connected with the varied career of the Zoological Gardens and the Society. Dr. Robert Ball, his father, was a former Secretary, and so was more recently his brother, Dr. Valentine Ball, while another brother, Sir Robert Ball, has occupied the Chair of President of the Society.

The position of the Secretary is not limited to a number of years by the statutes of the Society, yet Dr. Scharff has placed his resignation in the hands of the Council because he felt he could no longer devote the necessary time and care to the Society's affairs. The Council feel that in accepting Dr. Scharff's resignation as Secretary they should place on record their appreciation of the unfailing care and attention he has given to the work of the Society and the various improvements that have been made and carried out by him in the Gardens. They feel that they have lost a most valuable officer, but trust that the Society may still have the benefit of his counsel and advice as a member of Council. The Council propose as his successor Professor Carpenter.

In November, 1910, the Society's Treasurer, Dr. Cosgrave, delivered a lecture in the theatre of the Royal Dublin Society (kindly granted by the Council), illustrated by a series of beautiful lantern slides, and drew attention to some of the most noteworthy features in the gradual growth and development of the Dublin Zoological Gardens. The lecture was much appreciated and largely attended.

THE GARDENS.

A special paragraph is devoted this year to the Gardens on account of the noteworthy changes which have been made there. At the commencement of last year the Distress Committee of the City of Dublin Corporation sent twenty of the unemployed men free of charge to the Society. Under Mr. F. W. Moore's skilled direction they were employed carrying out several schemes long ago contemplated, but abandoned owing to lack of funds. The old half broken-down fence and fallen tree-trunks around the middle lake were first cleared away, stones and rubble of all sorts

were then carted to the shores of the lake, and on this foundation beautiful walks were made round the lake and a bridge built across it. In a way the unemployed, although of the greatest use to the Society, entailed indirectly a good deal of extra expense. Loads of stones and gravel had to be bought and numerous shrubs and trees planted to adorn the newly opened walks. However, the look of the Gardens has been greatly improved by these undertakings.

It is proposed during the coming year to plant shelter belts of shrubs on the far side of the lake for the protection of the many beasts and birds which roam freely about the Gardens.

BUILDING WORK.

The expenses connected with the New Lion House left the Society's finances in a very exhansted condition. Plenty of desirable schemes were discussed. The Council even went so far as to settle on a site for the most urgent of these proposals, namely, the hospital and isolation house. Mr. MacCarthy submitted plans which were approved of, and yet, no money being available, the scheme must again be shelved for another year.

The principal work finished during the past year is a fine new Aviary, designed by Mr. MacCarthy, in the divisions of which the various Eagles are now placed. It is somewhat novel in design, and was originally intended for the crow family (Corvidae). The latter will, however, be put in the older cages near the Elephant House. This will carry out the wishes of the late Mr. W. H. M. Barton, who left a legacy for the purpose of providing a separate set of cages for the crow family.

A few cages for carnivores were also designed by Mr. MacCarthy for the recess (apse) in the Roberts House. These are now being put up. The principal other works consisted in repairs and slight alterations to the existing structures, and extensive painting.

THE LIONS.

It has been customary for many years past to devote a special paragraph to the Lions, because they form such a conspicuous feature of the Society's collection. Not only do they still constitute one of the great attractions in the Gardens, but it may safely be said that never in the history of the Society has such a magnificent show been brought together in Dublin as at the present moment. There are now in the Lion house twenty-one Lions, four Tigers, two Jaguars, and five Leopards—altogether thirty-two large carnivores.

The new wire cages are greatly admired by everyone, but especially by those who wish to draw, paint or photograph the Lions. The Society never had so many artists studying the animals as last year.

The number of Lions and Lionesses at present in the Gardens is twenty-one. Of the ten Lions seven were born in the Gardens, while of the eleven Lionesses, eight are of Irish birth.

BREEDING OF STOCK IN THE GARDENS.

Once more three Puma cubs were born in the new outdoor Carnivore House. Among other births six Lion cubs deserve special mention, as well as a hybrid Zebra foal and a young Llama.

THE YEAR'S LOSSES.

The losses have, unfortunately, been severe during the past year. Two Gibbons, two Chimpanzees, a Huanacho, two Leopards, one Puma cub, a Sea-Lion, some Flamingoes, several Rheas, and other birds succumbed to various diseases. Tuberculosis, congestion of the lungs, peritonitis, and some form of gastritis claimed most of the victims according to the *post mortem* examinations conducted by Professor Mettam, who acts as the Society's prosecutor. A Leopard, a Himalayan Bear, and a Tasmanian Devil and several birds died from old age, a Capybara was killed by its companion, the Reindeer's constitution was evidently weakened by the large number of maggots of a warble fly embedded in its back. In several cases the cause of death could not be ascertained.

There can be no doubt that a properly equipped hospital—where new arrivals can be isolated for a time, where ruminants can be placed into quarantine, and where the sick could be properly attended to and nursed—is a necessary adjunct to the Gardens, and it is to be hoped that funds will be forthcoming soon to carry out this desirable addition to the Gardens.

THE REFRESHMENT DEPARTMENT.

Since the Society has taken over this department and has established a special Member's Room with a small library, the receipts have steadily increased. The year before last about £70 profit from this source were used in improving the heating and lighting of the Refreshment Room, in providing a larger range for the kitchen, and various other improvements connected with the Haughton House. In spite of the most inclement season of last year, a handsome profit has been earned by the refreshment department and will be handed over to the general fund of the Society.

The statement of account shows that the year 1910 opened with a balance in hand of £461 18s. 2d. The expenditure for the year amounted to £4,243, of which the principal items are £250 for purchase of animals, £1,029 for feeding, £977 for building and repairs, and £1,332 for salaries and wages. The year closed with £24 in hand, and outstanding liabilities estimated at £100.

GENERAL SIR NEVILLE LYTTTELTON seconded the adoption of the Report, which was supported by Mr. ABRAHAM SHACKLETON, and carried unanimously.

Mr. W. E. PEEBLES proposed, and Dr. J. O'CARROLL seconded, a change in the rule relating to the ballot for the Council and Officers at the Annual Meeting. The change was agreed to.

Professor J. A. SCOTT, M.D., gave an account, illustrated by an excellent series of lantern slides of the principal events at the Gardens during the year 1910.

The result of the ballot for the Officers and Council was then declared. Sir Charles Ball, M.D., was chosen as President; Dr. S. T. Gordon was added to the list of Hon. Vice-Presidents; Dr. R. F. Scharff and Professor J. A. Scott were made Vice-Presidents; Professor G. H. Carpenter was elected Secretary; Dr. J. O'Carroll, J. Inglis, J.P., and General Sir Neville Lyttelton were elected to fill vacancies on the Council.

DUBLIN MICROSCOPICAL CLUB.

JANUARY 11.—The Club met at Leinster House. A. R. NICHOLS (President), in the chair.

Dr. G. H. PETHYBRIDGE showed the parasitic fungus *Peridermium Pini* f. *corticola*, producing the so called "Bladder Rust" on the Scots Pine. The examples were from the woods of Mr. R. J. Ussher, J.P., at Cappagh, Co. Waterford, where the fungus is causing very considerable damage. There are two of these rusts which attack Scots Pine belonging to f. *corticola*. The life-history of one has been known for some time, the aecidial stage being found on the bark of this tree, and the uredo and telento-stages occur on such plants as Vincetoxicum, Paeonia, Nemesia, &c. None of these second hosts are, however, found naturally in Ireland, and it is improbable that the fungus exhibited was the one which is now known as *Cronartium asclepiadeum* (Willd.), Fr. The secondary hosts of the second species remained long unknown in spite of the fact that a large amount of research was carried out in order to discover them. A year or two ago, however, Dr. Liro showed that a rust found in Finland on the leaves of certain species of Lousewort, and previously described as *Uredo Pedicularis*, Dietr., could be artificially produced by infecting Lousewort leaves with spores of the Bladder-rust on the Scots Pine. Hence this rust has now been named *Cronartium Peridermium-Pini* (Willd.), Liro. It is probably this species that occurs at Cappagh, and the uredo-stage on Lousewort should be looked for there. Attacks of this kind on Scots Pine are by no means common, and this is the first recorded occurrence of this fungus in Ireland if not in Great Britain.

R. SOUTHERN showed a specimen of the Sabellid worm, *Bispira volutacornis*, Montagu. This specimen was found by Miss Delap in Valencia Harbour. It is the only one so far obtained in Irish waters. It is the largest species of this group on our shores, and it is surprising that it has been overlooked so long, especially in such a well-worked district as Valencia Harbour. This species is found in the western part of the English Channel, and in the Mediterranean, and is a notable addition to the Lusitanian group.

BELFAST NATURALISTS' FIELD CLUB.

JANUARY 25.—GEOLOGICAL SECTION.—ROBERT BELL showed a coral new to the district, which he discovered in the *angulatus* zone of the Lower Lias at Hillsport, and which has been determined by Mr. Lang to be *Isastraea endothecata* (Duncan).

S. A. BENNETT, B.A., B.Sc., of Campbell College, Belfast, gave a lecture on "The Lower Carboniferous Rocks of the North Staffordshire Coalfield." In the course of the discussion A. R. Derryhouse, F.G.S., emphasised the equivalence in point of time of the Pendlesides and the Yoredales of the North of England.

THE SURVEY OF CLARE ISLAND.

REPORT OF PROGRESS DURING 1910.

BY R. LLOYD PRAEGER.

(A report laid before the Royal Irish Academy, 27th February, 1911.)

IN a report laid before the Academy on 8th November, 1909, and published in the following issue of this Journal, I gave an account of the work carried out during that year in connection with the Natural History Survey of Clare Island and its neighbourhood. During the year 1910 work has proceeded steadily, so that we may confidently look forward to finishing the field-work by the end of the forthcoming season.

The first working party of 1910 took the field at Easter, which fell in the last week of March. F. Balfour-Browne and A. W. Stelfox worked for water-beetles and mollusca respectively in the Louisburgh, Westport and Achill districts, the latter subsequently proceeding to Belmullet. On the island, W. J. Lyons set up meteorological instruments, Prof. C. J. Patten studied the birds, and R. Ll. Praeger completed his vegetation map. All returned in about a week. On March 31, F. J. Lewis commenced his work on the peats of the district, spending ten days on the north side of Clew Bay, camping out in very severe weather.

A special Clew Bay marine party took up their quarters at Belclare from May 6 until May 12, and devoted a tempestuous and bitterly cold week to shore-collecting and dredging. N. Colgan added considerably to his list of marine Mollusca; Miss Stephens collected Sponges; A. R. Nichols, Polyzoa; W. Rankin, Decapoda; and Miss M'Nab and R. Ll. Praeger rendered general assistance. In addition to the groups mentioned, a good deal of collecting was done in a number of other groups.

The fresh-water Algae of the island were worked on May 14-22 by William West, who also made valuable collections of Lichens and Bryophytes.

On June 6, Rev. W. F. Johnson and Mrs. Johnson went west, and carried out nearly four weeks' insect-collecting in the Achill and Mallaranny districts. They were joined two days later by W. F. de V. Kane and T. Greer, who did a week's work at Lepidoptera at Achill Sound before crossing to the island.

Prof. Cole and T. Halissy examined the geology, and especially the glacial features, of the district between Westport and Achill on June 14-15, when, after a day's work on the island, they visited the Louisburgh district, and thence home.

On June 16, a large party crossed to the island, comprising A. D. Cotton (Marine Algae), A. C. Forbes (Forestry), T. Greer and W. F. de V. Kane (Lepidoptera), H. Wallis Kew (Pseudoscorpiones, &c.), Paul Kuckuck (Marine Algae), Pastor Carl Lindner and R. J. Ussher (Birds), W. J. Lyons (Meteorology), R. Welch (Photography), and R. Ll. Praeger. Much collecting and observing were done. Mr. Kane left on June 20 for a fortnight's collecting round Louisburgh and Belclare, and Mr. Ussher and Herr Lindner on the same day sailed to Belclare to join N. H. Foster, who had arrived there three days previously, in studying the breeding birds of the Clew Bay islands and Belclare district. The majority of the rest of the party returned from the island at the end of a week, A. D. Cotton remaining there until June 24, when he proceeded to Louisburgh for a week's work in company with J. Adams, who had arrived there on the 22nd. Indeed, during June our workers pervaded the whole district.

In July also much work was done, especially in the domain of entomology. J. N. Halbert went to Louisburgh on July 1 for a fortnight's insect collecting. He was joined on the 12th by Claude Morley, who worked there at Hymenoptera, &c., until the 20th, when he crossed to the island in order to join Percy E. Grimshaw (Diptera), N. Colgan (Marine Mollusca), Miss Stephens (Sponges), Miss Knowles (Lichens, &c.), Rev. Canon Lett (Mosses and Hepatics), F. J. Lewis (Peat deposits), and R. Ll. Praeger. At the close of a busy week the party broke up. P. E. Grimshaw collected at Achill, Mallaranny and Westport

for some days longer, and N. Colgan examined the Mallaranny shores. Miss Stephens and Miss Knowles worked southwards into Connemara. During this month also Prof. C. J. Patten spent a fortnight investigating the local birds.

On August 15, in very tempestuous weather, a small party took the field:—T. J. Westropp (Archaeology), N. Colgan (Marine Mollusca), W. J. Lyons (Meteorology), and R. Ll. Praeger. It was two days before they succeeded in crossing to the island, but the time was not wasted. Achillbeg and the coast east and west of it were explored, some interesting and hitherto unknown cliff forts and kitchen middens being discovered. The Fisheries steamer, "Helga," arrived at the island on the 16th with G. P. Farran, L. E. Smith, and R. Southern on board, and, joined by Colgan and Praeger, several days' dredging and trawling were accomplished, in spite of loss of gear owing to rough weather.

Meanwhile W. A. Wattam arrived from Huddersfield on August 20, and in a fortnight's work made large collections of Lichens, with Achill Sound and Dugort as headquarters. Rev. W. F. Johnson and Mrs. Johnson paid a second visit to the district in September, collecting insects on the island for a fortnight and at Achill Sound for a week. Rev. Canon Lett also revisited Achill Sound, and finished his collecting there. Prof. Patten revisited the island from September 9 to 29, and studied the autumnal migration of birds.

On October 2, a strong Cryptogamic party crossed to the island, comprising Sir H. C. Hawley (Fungi), A. D. Cotton (Marine Algae), Miss A. Lorrain Smith (Lichens and Fungi), Miss Beatrice Taylor (Lichens), and Miss Knowles (Lichens); the party also included Miss Stephens (Sponges), and R. Ll. Praeger. Four to six days' collecting were done on the island by the various members, after which they scattered, and the Achill Sound, Louisburgh, Belclare, Westport and Castlebar districts all received attention.

A late fungus foray was carried out during the third week in November by Carleton Rea, accompanied for two days by R. Ll. Praeger. Operations were hampered at

the beginning by snow lying on the ground, but this soon passed away, and a good list of the later kinds was made, including no less than thirty species new to the Irish flora.

The last visit of the season was made by Prof. Patten, who crossed to the island on December 27 to spend a week in studying the winter avifauna.

Reviewing generally the work of 1910, very substantial and satisfactory progress has been made, in spite of an unfavourable season, which was, on the whole, cold and stormy. Many of the groups which were hanging back last year, such as Birds, several orders of Insects, Lichens, and fresh-water Algae, have been extensively studied or collected, and in many other groups new ground has been broken. The list of animals or plants not hitherto recorded from this country has now assumed large proportions, and many of these are of much interest. The work in a number of groups has now reached or approached completion, and it will be possible to terminate the field-work at the end of the present year by vigorous collecting and observing.

Dublin.

SOME NOTES FROM THE WEST COAST.

BY A. R. SANDERSON AND C. A. CHEETHAM.

THE first week in August of last year was spent in Donegal, with headquarters near Killybegs on the shore of Donegal Bay. Perhaps the most interesting flowering plants noticed were *Sisyrinchium anceps* (in two situations—one, as before mentioned, near Fintragh, and the other on a small headland about two miles from Killybegs). Since first finding this plant in Donegal we have had the opportunity of seeing specimens from the United States, and we were both struck with the remarkable general similarity of the specimens from America (identified as *S. gramineum* of Curtis, and *S. anceps* of Edition VI., Gray's New Manual of Botany, Handbook of flowering plants and ferns of Central and N.E. U.S.A.), but differing from *S. angustifolium*, Mill. (Gray's Manual, 7th Edition) in having much shorter bracts,

though some variation was noticeable. The next plant in interest was a very large-flowered form of *Jasione montana*, seen on the seaward side of Slieve League near the summit, and this plant was also remarkable for the rosette of very large leaves. C. A. Cheetham, who was in the same district the previous Whitsuntide, was much struck with the splendid show of *Habenaria albida* occurring in wet meadows almost at sea-level between Killybegs and Fintragh, while later, we both noticed on the sand hills near Fintragh *Juniperus nana* and *Viola Curtisii*. *Carduus pratensis* was quite a feature of the wet low-lying meadows, and *Vicia sylvatica* of the sea-coast, occurring in some places in very large masses. Another interesting feature of the sea-coast as a habitat was the common occurrence of white-flowered specimens of *Erica Tetralix*, *E. cinerea*, *Geranium Robertianum*, and *Ajuga reptans*.

Besides attending to the flowering plants, we spent some time in examining the zoophytes on and near shore, and amongst these noted the following from this district :—

Sertularia pumila.	Podocoryne Sarsii.
S. operculata.	Plumularia similis.
Obelia geniculata.	P. echinulata.
Leptoscyphus tenuis.	Coryne pusilla.
Corynopsis Alderi.	Clytia Johnstonii.
Garveia nutans.	Calycella syringa.
Campanularia flexuosa.	

The third week in August, spent in County Clare, with headquarters near Liscannor, proved no less interesting, and here the party was augmented by Messrs. Fisher and Child. One of the flowering plants seen near Liscannor and again at Kilkee and Kilrush was *Senecio vulgaris*, var. *radiatus*. Only a few plants were seen at Kilrush, on the roadside in the channel, near the docks, and two plants near the station at Kilkee; but at Liscannor (again near the approach to harbour) it was present in considerable abundance at this spot only. Has this anything to do with its distribution?

Another plant of interest was *Scutellaria minor* which was seen sparingly in a boggy field near the south-west end of the Cliffs of Moher.

A day spent in the Ballyvaughan district proved most interesting and made us all feel sorry we had not settled down nearer Ballyvaughan in the first instance. Most of the typical Burren plants were seen.

The following is a list of the zoophytes gathered on the coast in the Liscannor district :—

Sertularia pumila.	Plumularia similis (on Laminaria).
S. operculata.	Coryne pusilla.
Obelia geniculata.	Clytia Johnstonii (on Campanularia flexuosa).
Leptoscyphus tenuis (on Laminaria).	
Campanularia flexuosa.	

Besides these large numbers of the Sea Hare (*Aplysia punctata*) were seen in a shallow pool near Clahorne, Liscannor Bay.

MOSSES.

The mosses though not systematically worked were not neglected, and some very interesting things were noticed, as, for instance, at Killybegs (Donegal) the occurrence of *Bryum filiforme*, *B. alpinum*, and *Splachnum ampullaceum* almost at sea level; *B. filiforme* fruiting abundantly, a somewhat rare occurrence. Other mosses noticed in fruit and which are infrequent in this state were *Hylocomium brevirostre*, *H. lorcum* and *Thuidium tamariscinum*. *Grimmia maritima* and *Ulota Hutchinsiae* of the shore rocks were new to us, as were also the large masses of *Funaria cricitorum* and *F. Templetoni*. On Crown-a-ragh, a hill some 1,600 feet high, we gathered *Dicranella secunda*, *Webera clongata*, *Racomitrium protensum*, and *R. heterostichum*, var. *gracilescens*; and also the hepatic *Herberta adunca*. Other mosses from this (Donegal) district include *Weisia tortilis* and *Trichostomum tenuirostre*.

In the Westport district we gathered amongst others, *Polytrichum nanum*, *Campylopus brevirostre*, *Fissidens osmundoides*, *Hypnum callichroum*, and *Grimmia trichophylla*. At Mallarany *Ulota crispa* growing on rocks was an interesting variation from the tree habitat usually associated with this species.

ADDITIONS TO IRISH ALGAE, LICHENS, AND FUNGI TO THE END OF THE YEAR 1910.

BY J. ADAMS, M.A.

IN the year 1908 I published "A Synopsis of Irish Algae, Freshwater and Marine" (*Proc. Roy. Ir. Acad.*, vol. xxvii., Sect. B, No. 2). This was followed in 1910 by "A List of Synonyms of Irish Algae with some additional Records and Observations" (*Proc. Roy. Ir. Acad.*, vol. xxviii., Sect. B, No. 5). In 1909 appeared "The Distribution of Lichens in Ireland" (*Proc. Roy. Ir. Acad.*, vol. xxvii., Sect. B, No. 10); and in 1910 "A Census Catalogue of Irish Fungi" (*Proc. Roy. Ir. Acad.*, vol. xxviii., Sect. B, No. 4), the last being the joint work of Dr. Pethybridge and myself. I propose in the present short article to include all additional Irish records and papers published on these groups up to the end of the year 1910. From that year onwards I hope the workers at the various groups will publish every five years a Supplement in which the facts and figures of each group will be brought up to date.

I. ALGAE.

FRESHWATER SPECIES.—Nothing additional.

MARINE SPECIES.—The only additional information consists in the record of *Codium clongatum* and *Lcathesia crispa* from Clare Island. Mr. Cotton is of opinion that the former of these species is something quite different, and hopes to publish full particulars about it shortly. Mr. Cotton has also informed me that the Irish record of *Lithothamnion Racemus* Fosl. in Batters's Catalogue is an error, and consequently that species must be withdrawn from the Irish lists.

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2. LICHENS.

Nothing additional has appeared in connection with this group. *Botrydina vulgaris* Bréb., which was included in "A Synopsis of Irish Algae" as a doubtful Alga has, since the publication of that paper, been shown by Miss E. Acton (*Annals of Botany*, Oct. 1909) to be a lichen, and therefore must be reckoned as an addition to this group.

3. FUNGI.

The following species are not recorded in the "Census Catalogue" and are additions to the Irish Flora:—

Accidium clatinum Fisch. (= *Melampsora caryophyllacearum* Schroet.), Co. Cork. Dr. Pethybridge informs me that this species grows on Silver Fir at Avondale in Co. Wicklow.

Colletotrichum lindemuthianum Br. et Cav.—Dublin.

Coniothyrium Fuckelii (Sacc.).—Larne.

Cucurbitaria Piccae Borthw.—Co. Dublin.

Peronospora grisea Ung.—Bohernabreena and Howth, Co. Dublin.

Phoma oleracea Sacc.—Kilkeel, Co. Down.

Rhizoctonia violacea Tul.—Co. Mayo and Co. Roscommon.

Sclerotinia cinerea Schroet.—Co. Antrim.

Septoria Lepidii Desm.—Devil's Glen, Co. Wicklow, and Greyabbey, Co. Down.

Uredo Lynchii Plow.—Botanic Gardens, Glasnevin, Co. Dublin.

In the "Census Catalogue of Irish Fungi" *Botrytis parasitica* Cav. is the same species as *Sclerotinia parasitica* Mass., and the former name should therefore be removed from the list of valid species.

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Royal College of Science, Dublin.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Rhesus Monkey from Miss F. K. Thompson, a Canadian Lynx from the President (Sir Charles Ball), a Mongoose from Mr. F. G. Paine, a Syrian Bear from the Royal Artillery Battery, Farnborough (per Major F. L. Sharp), Badgers from Messrs. Phelan and O'Connell, a Grey Seal from Sir Charles Petrie, a Squirrel from Dr. R. R. Leeper, Goldfinch-Canary Mules and Linnets from Mr. W. Hall and Mr. R. Carley, two Kestrels from Mr. W. W. Despard, a Heron from Mr. R. R. FitzHerbert, and a Viviparous Lizard from Mr. R. S. Chatterton.

A Black Ape has been purchased. This interesting Celebean species has not been represented in the collection for many years, and the fine specimen now acquired forms a valuable addition to the Monkey House. Two Squirrel Monkeys, which have lately been obtained by exchange, are also most attractive creatures. The young female Syrian Bear, which the Society has been given through the kindness of Major Sharp, was for some years a regimental pet. She is very tame and climbs the pole in the bear pit with much agility.

DUBLIN MICROSCOPICAL CLUB.

FEBRUARY 8.—The Club met at Leinster House. A. R. NICHOLS, M.A., (President), in the chair.

Dr. G. H. PETHYBRIDGE exhibited a specimen of the fungus *Geaster fornicatus* Fr., one of the so-called "earth-stars" which had been found in the neighbourhood of Mullingar, Co. Westmeath. This species has not previously been recorded as occurring in Ireland. The specimen was somewhat aberrant from typical forms of this species, in that the endoperidium was almost sessile. Comparison with a series of forms preserved in the British Museum (Natural History), kindly carried out by Miss Lorrain Smith, showed, however, that the specimen in question was *G. fornicatus*.

W. F. GUNN showed a specimen of *Tingis histricellus*, a plant bug from Ceylon, which feeds upon and causes injury to several economic plants in the island. It is characterised by extreme modification of the elytra, the sides and surface of which are armed with extremely stout and strong spines, giving the insect a peculiarly formidable appearance. Shown under a binocular microscope as a low-power object, it incidentally demonstrated the advantages of binocular vision for certain classes of objects, whereby great focal depth is secured, and the co-relation of the various parts more easily seen than is possible with a monocular.

A. R. NICHOLS exhibited a portion of a bifurcating branch of the deep-sea Polyzoon *Kinetoskias Smithi*, showing the greatly elongated and highly specialized avicularia and their method of attachment to the zooecia. The specimen was dredged by the Fisheries Branch in 661-672 fathoms off the south-west coast of Ireland. This rare and remarkable polyzoon has previously been obtained only off the coasts of Norway and off the coasts of Maine and Nova Scotia.

BELFAST NATURALISTS FIELD CLUB.

DECEMBER 7.—ZOOLOGICAL SECTION.—Several members spoke of their work during the year. N. H. FOSTER (Chairman of the Section) spoke on Birds and Woodlice, F. BALFOUR BROWNE on Water-beetles, H. L. ORR on Wasps, R. WELCH on land and freshwater Mollusca, and J. MAXWELL on pond life. GEORGE DONALDSON spoke on the capture of *Gonepteryx rhamni* at Newcastle, Co. Down, a butterfly rare in the North of Ireland.

JANUARY 17.—R. J. Welch (President) in the Chair. The evening was devoted to appreciations of the life and work of the late S. A. Stewart, A.L.S., by several members. Rev. C. H. Waddell gave an account of Stewart's life; R. Lloyd Praeger of his work in botany and in geology; R. Welch of his work in zoology. W. Gray, George Donaldson, W. Swanston, J. Brown and J. Hamilton also spoke, contributing interesting reminiscences of their late fellow-member.

FEBRUARY 8.—ARCHAEOLOGICAL SECTION.—MISS ANDREWS read a paper on "Folklore from Donegal." She gave traditions of fairies, giants, Danes, Finns, and Firbolgs, and mentioned that the fairies of Tory Island are said to dress in black. She reminded the section that Tory Island or Toirinis was a stronghold of the Fomorians, whom Keating describes as "sea rovers of the race of Cain, who fared from Africa." The inference was drawn that the fairies of Tory Island represent a dark race. She mentioned the belief that men and women can change themselves into animals, and narrated a story told thirty-five years ago by John Sweeney, an Inspector of National Schools, of a Highlander who as a seal visited a cave in Arranmore, and there received a scar on his head. In conclusion Miss Andrews urged the necessity of collecting these old tales, as if they are allowed to perish one link with the past will be irretrievably lost.

JANUARY 21.—BOTANICAL SECTION—Rev. C. H. Waddell, continuing his series of studies on the ecology of plants, gave a paper entitled "Plant Life in a Marsh."

FEBRUARY 15.—THE GEOLOGICAL SECTION.—A. R. DWERRYHOUSE, F.G.S., read a paper on glacial lakes and their overflow channels. The lecturer introduced the subject by referring to certain existing lakes whose waters are held up by a dam of glacier ice, and as an example cited the Merjelen Sea, on the flanks of the great Aletsch Glacier in Switzerland. He then described certain well-known examples of such deserted overflow channels in Great Britain, referring particularly to those described by Professor P. F. Kendall, from the Cleveland Hills, and those of Teesdale, Weardale, and the Tyne Valley. The North of Ireland, it was stated, contained fine examples of these overflow channels, produced during the Glacial Period, several of which had been described by the officers of the Geological Survey in the Belfast Memoir, 1904. In conclusion Dr. Dwerryhouse stated that he was engaged in working out the distribution of these valleys in the counties of Antrim and Down, and hoped to be able to lay the results of his work before the Society at a later date.

FEBRUARY 18.—BOTANICAL SECTION.—Alex. Milligan read a paper entitled "The Study of Fungi."

FEBRUARY 21.—R. J. Welch (President) in the Chair. Prof. G. A. J. Cole lectured on "The Close of an Ice Age, or Comparison between Spitzbergen and Ireland in 1910." The lecturer dealt with observations made during a visit to Spitzbergen last summer on glacial phenomena, and showed how many of the features of Irish glacial geology can be explained by what can be actually seen taking place at the present time in Spitzbergen.

MARCH 1.—ZOOLOGICAL SECTION.—The evening was devoted to a discussion on the dispersal of plants and animals, in which the following members took part:—N. H. Foster, R. Ll. Praeger, F. Balfour Browne, A. W. Stelfox, A. R. Derryhouse, Prof. Gwyn Vaughan, H. L. Orr, and C. M. Cunningham.

DUBLIN NATURALISTS' FIELD CLUB.

NOVEMBER 12.—Winter Excursion to the BOTANIC GARDENS.—Only a few members took part in this excursion. Owing to the unfavourable weather the party confined their attention to the plants in the green-houses. The chrysanthemums were first inspected and then the Cactus house; in this house are grouped plants from the desert regions of a xerophilous nature. In the stove house great interest was taken in the various tropical economic plants. A visit to the Orchid and Palm House concluded the afternoon.

NOVEMBER 15.—The twenty-fifth Winter Session was opened with a CONVERSAZIONE in the house of the Royal Irish Academy, Dawson Street, under the presidency of R. J. USSHER, D.L., M.R.I.A. The attendance was fairly large, 152 members and visitors being present. At 8.30 p.m. the President took the chair, and after the usual formalities were over, Prof. G. A. J. Cole, F.G.S., delivered a very interesting lecture on "The Close of an Ice Age: a Comparison between Spitzbergen and Ireland," which was illustrated by a number of lantern slides showing some of the most notable features of the island, as well as a series of similar geological formations in Ireland.

During the evening a collection of objects of scientific interest were on view; these included the following:—C. F. Ball—Some Photographs showing Alpine Plants in their natural haunts. Richard M. Barrington, M.R.I.A.—(a) Specimens of the Red-backed Shrike (*L. colluris*) from Wicklow Head and the Fastnet Rock Light-stations; (b) Nest of wasp (*Vespa sylvestris*) inside that of the House Martin (*Cotile riparia*). J. Bayley Butler, M.A., M.B.—Spicules of some Holothurians under the polariscope. Miss Buchanan—(a) Specimens of petrified molluscs from Gortatole quarry, County Fermanagh; (b) A collection of fossils. Professor G. H. Carpenter, M.R.I.A.—Reindeer Warble Fly (*Edimagna Tarandi*), with eggs and larvæ, from the Dublin Zoological Gardens. Professor Grenville A. J. Cole, M.R.I.A., F.G.S.—Specimens of scratched stones and shelly boulder-clay from existing glaciers in Spitzbergen (lent

by the Royal College of Science), collected 1910. J. Duffy—(a) Fossils from Chalk and Greensand, Whitehead, Belfast; (b) Some sharks' teeth. Mrs. Espinasse—(a) Fungi from Mauritius; (b) Pitch from Lake Trinidad; (c) Baskets from Madeira and some foreign fruits. Professor Gregg Wilson, D.Sc. (B.N.F.C.)—(a) Eggs (uterine and nest) and young of Australian Duckmole (Platypus); (b) Eggs of Cuckoo in nests of various kinds. W. F. Gunn—(a) A collection of blooms illustrating the evolution of shape, size and colour in the floral organs of *Chrysanthemum Indicum*; (b) Some fruits from native trees. J. N. Halbert, M.R.I.A.—Some silk-producing moths from the collection of the National Museum. T. Hallissy, B.A.—Some Donegal rocks and minerals. Mrs. Harford—A morell fungus (*Morchella*) from Co. Dublin. J. de W. Hinch—Geological specimens from Co. Donegal. (a) Mullion-structure in quartzite, Creeslough; (b) Collection of erratics from Tory Island. Professor T. Johnson, D.Sc., M.R.I.A.—Microscopic sections of the stem and leaf of a fossil pteridosperm (seed-bearing fern). Miss C. M'Nab—Revolving microscope with twelve slides of Polyzoa. A. R. Nichols—American Blue-Winged Teal (*Onerquedula discors*), shot in Co. Cork, September, 1910: first occurrence in Ireland. A. ROYCROFT—(a) Collection of Carboniferous fossils; (b) Specimen of galena from Ballycorns; (c) Sample of copper pyrites and of peacock copper ore from the newly re-opened copper mine at Beauparc, Co. Meath; (d) Copper-ore from Loughshinny copper mine. Robert F. Scharff, Ph.D., M.R.I.A.—(a) An almost complete skull of the Sabre-toothed Tiger (*Machairodus sp.*) from the asphaltine deposits of Los Angeles Country, California; (b) Original Orang-Utan skull from which skiagrams (see below) were taken. G. O. Sherrard—The causes of some plant diseases. Rowland Southern, B.Sc.—Some remarkable worms. Miss J. Stephens, B.Sc.—A collection of West Indian corals. George Strahan—Specimens from Prosperous Bog, Co. Kildare. Professor Symington, D.Sc., F.R.S. (B.N.F.C.)—Photographs and skiagrams of skull of an Orang-Utan. Miss E. H. Wilson—(a) Cases of butterflies and beetles; (b) Botanical specimens. W. B. Wright—(a) Photographs of the Preglacial beach of the Western Islands of Scotland; (b) Monchiquite dyke from Colonsay; (c) Radium ore from Sweden.

DECEMBER 10.—Winter Excursion to the ZOOLOGICAL GARDENS.—The afternoon turned out very wet, and in consequence only six members and visitors assembled outside the Superintendent's House at 2.30 p.m., when Captain Arbuthnot showed them round the Gardens and pointed out the principal additions to the collection. After inspecting the emus and rheas, the party visited the Monkey House, where are also to be seen a number of the small carnivora. Proceeding then to the Roberts House the members had an opportunity of witnessing the feeding of the large carnivora. The large open-air aviary attracted a good deal of attention, and the Ungulates were seen in their paddocks. The members next visited the Reptile House and Aquarium where a very interesting demonstration of the characteristic feeding habits of the cormorant and penguin was given in the large diving tank. They then turned their attention to the Elephant House, to the open-air cages containing the

birds of prey, and afterwards to the seals and sea-lions. After watching the latter animals being fed the party broke up and returned to town by tram.

DECEMBER 13, 1910.—R. Lloyd Praeger in the chair. The Hon. Secretary read out the names of those proposed by the Committee as the Officers and Committee for 1911.

JOSEPH DOYLE read an interesting paper on "Mendelism" which was illustrated by lantern slides. J. B. BUTLER and R. LL. PRAEGER discussed the paper.

The Chairman made a preliminary announcement regarding the proposed discussions of problems raised by the recent Survey of Clare Island, Co. Mayo, to be held during the present session. Mr. Otway H. Little was elected a member of the Club.

JANUARY 7.—Winter Excursion to the NATIONAL MUSEUM.—Eighteen members and visitors assembled inside the Merrion Street entrance of the Natural History Museum at 2.30 p.m., when they were conducted over the Museum by A. R. Nichols. Starting with the collections in the Lower Hall the conductor explained that that portion of the Museum was now exclusively reserved for Irish animals, and contained some new additions, which he pointed out. The principal object of interest, however, was the realistic model of a marine rock-pool, exhibited near the foot of the large staircase, which R. Southern fully explained to the members. The party then visited the collection of the Geological Survey in the Curved Gallery, and were shown round by T. Hallissy, who afterwards proceeded to explain the characteristic crystalline forms assumed by various types of minerals. For this purpose he took the members to the Palaeontological Room to examine the models of crystals exhibited in that portion of the building. After a very instructive afternoon the party left the Museum at about 5 p.m.

JANUARY 10.—ANNUAL GENERAL MEETING.—The President (R. J. USSHER, D.L., M.R.I.A.) in the chair. The Hon. Secretary (A. H. TOPPIN) read the Annual Report for 1910, while the Hon. Treasurer (H. G. CUTHBERT) presented his annual report and balance sheet. The following resolution proposed by the President and seconded by the Hon. Secretary, was passed unanimously :—"That the report and statement of accounts as submitted by the Hon. Treasurer, showing a provisional credit balance of £4 4s. 10d., be passed, subject to audit and subject to the collection of any outstanding subscriptions." Both reports having been adopted, the Officers and Committee for the year 1911, previously nominated, were then declared by the President to be duly elected, viz. :—President, R. J. Ussher, D.L.; Vice-President, W. F. Gunn; Treasurer, H. G. Cuthbert; Secretaries, R. Southern, B.Sc., and A. H. Toppin.

The Hon. Treasurer proposed that Mr. W. F. de V. Kane, D.L., M.R.I.A., one of the few remaining founders of the Club, be elected an Honorary Member. The proposal was warmly received by those present and was carried unanimously.

R. LL. PRAEGER then delivered an address, "Introduction to Discussions of Problems raised by the Clare Island Survey," which was

beautifully illustrated by lantern slides showing the various features of the island.

Miss M. Crosbie, Miss R. M. Pollock, and Miss Edith White were elected members, whilst J. P. Aiken and J. M. Sheridan were elected associates of the Club.

JANUARY 27.—The President in the chair. The first of the series of discussions of problems raised by the Survey of Clare Island was opened by Messrs. J. R. KILROE and T. HALLISSY, who confined their attention to the geology of the island. J. R. Kilroe dealt with the physical features of Clare Island and the adjacent mainland, giving illustrations, whilst T. Hallissy, with the aid of a series of maps, traced the course of the ice sheet over the northern part of Europe, including the British Isles, and showed how it affected the surface of the land over which it passed. He pointed out especially the principal snow-fields in Ireland during the Glacial Epoch, particularly those from which the ice covering Clare Island was fed, and suggested that a land-connection between the island and the mainland existed in post-glacial times in the form of Boulder-clay which, in all probability, filled up the whole of Clew Bay. This connection was, in his opinion, sufficient to allow the fauna and flora to reach the island. There was also evidence to show that after the ice had receded the floor of Clew Bay was raised above the sea-level.

A discussion followed, in which G. H. Carpenter, G. A. J. Cole, A. C. Forbes, and W. B. Wright, took part.

FEBRUARY 25.—WINTER EXCURSION TO ST. DOULAGH'S.—Under the leadership of J. de W. Hinch forty members and visitors assembled at Amiens Street Station and took the 1.45 p.m. train to Portmarnock, from whence they walked to St. Doulagh's quarries, where a very profitable afternoon was spent in collecting and examining Carboniferous fossils. Some very good specimens were obtained, the principal species being:—*Amplexus coralloides*, *Orthis resupinata*, *Productus gigantea*, *P. semireticulata*, *Spirifera glabra*, *S. lineata*, *S. pinguis*, *S. striata*, and *Euomphalus pentangulatus*.

At five o'clock the members and their friends were entertained to tea by Mrs. Hone at St. Doulagh's Park, after which the party walked back to Portmarnock Station and took the 6.22 p.m. train to Dublin.

MARCH 14.—The Vice-President (W. F. GUNN) in the chair.

R. LI. PRAEGER in opening the discussion on the Botany of Clare Island, said that the chief problem requiring solution was whether the flora originally reached the island by a land-bridge, or across the intervening space of sea, the shortest distance over which was nearly three miles. He described the various ways by which plants spread over the land, and considered that wind-borne seed could not account for the present flora of Clare Island. Water, too, would be insufficient to convey seeds across, as only about 10 per cent. of the seeds of plants were capable of floating. The conclusion he arrived at, therefore, was that the flora of Clare Island was derived from the migration of plants over a land-connection with the mainland.

A discussion followed, in which G. H. Carpenter, N. Colgan, T. Hallissy, J. de W. Hinch, C. B. Moffat, and G. H. Pethybridge took part.

REVIEW.

ZOOLOGY FOR STUDENTS.

Outlines of Zoology. By J. ARTHUR THOMSON, M.A. Fifth Edition. Pp. xxii. + 856, with 420 illustrations. Edinburgh and London: Henry Frowde and Hodder and Stoughton, 1910. Price 15s.

It is four and a half years since the 4th edition of "Thomson" was reviewed in the *Irish Naturalist* (vol. xv., p. 230). The issue now before us appears under the auspices of a new publisher, and though the size of the book has not been increased, the use of a new fount of type, slightly smaller than that of former editions, but still beautifully clear, has rendered possible the inclusion of much new matter. For example we now find Lister's observations on the reproduction of *Polystomella* described and illustrated (though the microspheric form is erroneously stated to have a *large* central chamber); figures of antipatharian structure are given; there are diagrams of Ctenophora and of Arenicola: good pictures of Ixodes and other Acarinida are welcome to the economic zoologist; the account of Cephalodiscus is illustrated by two figures after Ridewood. In the sections on the Vertebrata the account of the pineal and associated structures has been revised in the light of the recent work of Dendy and others, while the systematic survey of the Mammalia is now well up to the present stage of knowledge.

Altogether the new edition is considerably more valuable than the fourth, excellent as that was, and the reviewer, though he could find statements to question here and there would do better to learn from the author some principles of successful book-writing. He would only suggest that in the sixth edition (may it be called for soon!) the chapters on the factors of evolution should be extended to twice their present size. Because the controversial questions grow more involved and difficult as time goes on, the elementary student needs increasingly a fuller discussion of them.

G. H. C.

NOTES.

ZOOLOGY.

Paromola Cuvieri off South-west Ireland.

It may be of interest to record the fact that the British Museum has recently received, by the kindness of Mr. H. Bolton, Curator of the Bristol Museum, one of two specimens of this very striking crab, which were got by a trawler "about 235 miles west of Milford in 160 fathoms of water" on a bottom of oozy mud and sand. The species was recorded from south-west Ireland in 1908 by J. N. Halbert (*Irish Nat.*, xvii., p. 129), and later by Mr. James Ritchie from off the north-west of Scotland (*Ann. Scott. Nat. Hist.* 1910, p. 12).

W. T. CALMAN.

British Museum (Nat. History), London, S.W.

Lepidoptera from Ulster.

At a meeting of the Lancashire and Cheshire Entomological Society held 21st November, 1910, at the Royal Institution, Liverpool, H. R. Sweeting, M.A., read a paper on Collecting in the North of Ireland during August, 1910. In this period only eight whole days were free from heavy rain, and in consequence of the unfavourable weather the results were much below what one might reasonably expect under good conditions. The outstanding feature of the holiday was the capture, on a private estate, of a long series of *Hydroecia crinanensis*; the moth was identified by Mr. F. N. Pierce, who examined all the specimens, while the bodies were yet soft enough to permit an inspection of the genitalia. A series of *Cidaria truncata* contained the usual forms and also a very fine melanic variety of the *centum-notata* form wholly suffused with fuscous, the hind wings being nearly as dark as the primaries; other specimens also had a strong melanic tendency. A series of *Noctua dahlia* contained some almost black examples. The butterflies were noteworthy as showing distinctly brighter colouring than is usually found in England. *Lycoena icarus* unfortunately was not met with: the females from this locality, as is well known, having very bright blue coloration. The paper was illustrated by a large-scale map of the district, coloured to indicate the collecting areas, a feature which added greatly to the interest of the descriptions. A discussion ensued, in which several of the members present gave their experiences in the North of Ireland.

Hymenoptera from Ulster.

My captures of Hymenoptera for 1910 have yielded some species new to our county lists. I am indebted to the following gentlemen for identifying species:—Rev. W. F. Johnson, D. R. Pack-Beresford, and W. F. L. Sladen. To Mr. Sladen I sent a great many of my insects; amongst them he discovered *Psithyrus barbutellus*. This is the first time this species has been recorded from the North. Mr. Sladen has also examined specimens recorded by me as *Bombus cullumanus* and *B. sororensis*; he finds that they belong to other species. *B. cullumanus* has not then been taken in Ireland. The species collected in Co. Antrim are *Formica fusca*, Whitehead; *Myrmica sulcinodis*, Belfast Cemetery; *Salius exallatus*, Cave Hill; *Crabro cephalotes*, Belfast Cemetery. In Co. Down—*Formica fusca*, *Vespa germanica*, *Odynerus parietum*, *Andrena minutula*, all at Ballywalter; *Psithyrus rupestris* at Dundrum; *P. barbutellus* at Castlereagh. In Co. Armagh—*Leptothorax acervorum* and *P. barbutellus* at Richhill. In Co. Louth—*Vespa sylvestris*, *Bombus hortorum*, and *B. terrestris* at Carlingford.

Mr. Sladen informs me that all my *Psithyrus vestalis* belong to var. *distinctus*.

H. L. ORR.

Belfast.

Mollusca and a Cumacean new to Ireland.

The Neomenians, *Rhopalomenia aglaopheniae* (Kov. and Mar.) and *Myzomenia banyulensis* (Pruvot) have hitherto been recorded only from Plymouth in the British and Irish area (*Journ. Marine Biol. Assoc.*, ser. 2, v., 1897-99, p. 510). The specimens mentioned below were obtained during the course of investigations carried out by the scientific staff of the Department's fishery cruiser *Helga*. In August, 1906, in a haul at $6\frac{1}{2}$ miles E.S.E. of Mine Head, Co. Waterford, two specimens of *R. aglaopheniae* were taken turned round the stems of *Aglaophenia myriophyllum*, L. at soundings of $29-29\frac{1}{2}$ fathoms. Another specimen, coiled, but free, was taken in April, 1906, in a haul at 10 miles W. by S. of Chicken Rock, Calf of Man, at soundings of 35-37 fathoms. A colony of *A. myriophyllum* from which it had probably become detached was present in the same haul, which appears to be just outside the Irish area as defined by Mr. Nichols (*Proc. Roy. Irish Acad.*, ser. 3, vol. v., 1900, p. 478). Nine specimens of *M. banyulensis* were taken in February, 1907, at $4\frac{1}{2}$ miles S.S.E. of Rockabill, at soundings of $20\frac{1}{2}-23$ fathoms. The species was twice observed at Lambay Deep. Four specimens of *Lafoëa dumosa* (Fleming) occurred in October, 1906, at soundings of 39-54 fathoms, and a few were taken in February, 1907, at soundings of 42-46 $\frac{1}{2}$ fathoms. Two specimens attached to *Hydrallmania falcata*, L. were taken in February, 1907, at $7\frac{1}{2}$ miles E. of Bailey Lt., at soundings of 24-25 fathoms.

A number of specimens of the Cumacean *Diastylis lucifera* (Kröyer) occurred in a haul at Lambay Deep, in May, 1904, at soundings of 32-50 fathoms. Dr. Calman who has kindly identified the species, states that it is rather a northerly form which does not seem to have been recorded from Irish waters.

ANNE L. MASSY.

Dublin.

Hyalinia Rogersi introduced at Hillsborough.

While searching recently for "introductions" in the hot-houses at Hillsborough Castle, in Down, Mr. Welch handed over to me a young example of a *Hyalinia* which, on account of its odour, was promptly put down in our list as *H. alliaria*. Several other specimens were afterwards collected associated with *Helicodisus lineatus* Say, and a few introduced species of woodlice. Upon subsequent examination at home I saw that these shells were not *H. alliaria*, but that they belonged to the *Hyalinia helvetica* group. The radula upon examination corresponds with that given by Mr. B. B. Woodward (*Journal of Conchology*, vol. x. p. 311) as characteristic of his species *H. Rogersi*, as compared with the true continental *H. helvetica* Blum. I am not in a position to give an opinion as to whether *Hyalinia helvetica* and *H. Rogersi* are distinct species or only races of one species, nor is this a question which concerns Irish conchologists. Suffice it to say that Mr. Woodward is convinced of the distinctiveness of his species, while Mr. J. W. Taylor (*Mon. L. and F. W. Moll.*, vol. 3, p. 46), considers it to be a local race of *H. helvetica*.

Belfast.

A. W. STELFOX.

Luvarus imperialis on the Coast of Donegal.

On September 8, 1910, a strange fish was left stranded at Walker's Bay, Killybegs, Co. Donegal, where we were spending our summer holiday. It measured 4 ft. 3 in. in length, weighed, as far as we could estimate, about a hundredweight, had a shiny porpoise-like skin, and quite brilliant scarlet fins and tail of mackerel shape. Had we known at the time what an exceedingly rare fish we had found we should have made an effort to preserve it, for it was quite fresh and in perfect condition, except for absence of eyes and slight damage to its head. The eyes had evidently been pecked out by the gulls, which hovered around it in large numbers. We did, however, remove the scarlet fins and tail and gave them to our host to preserve, but I am sorry to hear from him that his efforts were not successful, and they have gone the way of all flesh.

We were unable to find any fish resembling it in Yarrell's *British Fishes*, the only book to which we had access, at the time, but a recent visit to the Natural History Museum at South Kensington enabled us at once to identify it as a specimen of *Luvarus imperialis*. As far as I have been able to discover this fish has been recorded on only four previous occasions in the British and Channel Isles. By the courtesy of Mr. G. A. Boulenger I am able to give the following details and references.

Luvarus imperialis is a rare pelagic fish, found in the Mediterranean, and has been occasionally observed on the Italian and Sicilian coasts. Two were thrown ashore on the Cornish shore in 1866 (Day's *British Fishes*). One was captured at Seven Heads, Co. Cork, in 1901. This specimen was fully described with illustrations by Mr. Longfield, of Enniskean, in the *Field* of November 23, 1901, and by Dr. R. F. Scharff, *Irish Naturalist*, vol. x. p. 190. The fourth was found in 1902 at St. Martin's, Gurnsey (Boulenger, *Field*, October 25, 1902). I may add that the specimen I have described was seen by several people besides myself and my sons, including Colonel Sinclair, of Ballyloughan, Bruckless, Co. Donegal, and the Rev. J. T. Davies, of the King's School, Chester, who was a member of our party, and was the first person actually to see it.

W. J. CONSTABLE.

Uppingham.

Mealy Redpoll in Co. Carlow.

While out shooting rabbits here on December 26th last, in a young fir plantation, a Robin settled on a tree near me, closely followed by another small greyish bird that I had never seen before. Wherever the robin went this other bird followed it, and being struck by this behaviour I looked carefully at the second bird and at once saw that it was quite unknown to me. I was able to have a very good look at it as it sat on a tree not two yards from me. The bird was of a uniform speckled brownish grey with darker bars across the wings and had a bright crimson patch on the top of the head. As soon as I got home I looked it out in Morris's "British Birds" and had no difficulty in recognising it as a

Mealy Redpoll (*Linota linaria*, Linn). This identification I have since confirmed by looking at the stuffed specimens in the Natural History Museum in Dublin.

Mr. Ussher in his book on "The Birds of Ireland" says of this species, that it is "a very rare winter visitor, chiefly taken on the western islands." There is only one previous record of its occurrence in the province of Leinster, viz., at Levitstown, Co. Kildare, on 9th February, 1876, which is also the first record of its appearance in Ireland.

DENIS R. PACK BERESFORD.

Fenagh House, Bagnalstown.

The Irish Coal-Tit.

Referring to Mr. Nichols' note on the so-called "Irish Coal-Tit" (p. 45, *supra*), it may be of interest to mention that Mr. Ogilvie Grant very kindly showed me a large series of freshly killed specimens at the British Museum which were obtained by him from Ireland quite recently. Most of these differed from the ordinary English type—a few markedly so—others were almost identical with it, and intermediate forms were observable. So far as I know Irish naturalists were unaware of any local variation in the Coal-Tit, and Mr. Grant deserves credit for the discovery; but he will, I think, ultimately recognise that the Irish bird is not "a well marked species," and is rather an ill-defined race without (to borrow from the weather charts) "any steep gradients."

RICHARD M. BARRINGTON.

Fassaroe, Bray.

The Ulster Coal-Tit.

In the autumn and winter months the Coal-Titmouse is often to be seen in the woods here, flitting busily about among the underwood in large flocks, and usually accompanied by Blue Titmice, Golden-crested Wrens, and other little birds. They are always on the move from place to place, and disappear at times for weeks together. In the nesting season they are less common. All are of the ordinary *Parus britannicus* type. Once only, in the winter of 1909-10, in such a flock, I got a momentary view of one that puzzled me very much at the time—a Coal-Titmouse, apparently, with a crest like that of the Golden-crested Wren. Was it, perhaps, *P. hibernicus*?

W. E. HART.

Kilderry, Co. Donegal.

Landrail in December.

It may interest readers of the *Irish Naturalist* to know that on the 2nd of December a Landrail was killed in my garden by one of my dogs. It was in very poor condition. I have never seen one in this country so late in the year.

J. H. H. SWINEY.

Belfast.

Wild Cat supposed to be within Historic Times a Native of Ireland.

According to Dr. Scharff's examination of the cat bones from the Co. Clare caves, after comparison with that of *Felis catus*, he ascribes them to belong to an African species, probably a contemporary of the Reindeer, Mammoth, and Arctic Marmot, whose bones were found in the same caves. However, so far, there is no reliable information of *Felis catus* being a native among the records of our list of Irish naturalists, from the time of Wm. Thompson up to the present date. No doubt there are allegations, from time to time, of the capture and occurrence of Wild Cats, but, unfortunately, no specimens have been produced in proof of the statements; and as for stories by country people they may be all put aside as being of like value, as other mythical stories of fairies, banshees, cluricaunes, &c. However, from Major Barrett Hamilton's notes in the March number of the *Irish Naturalist* (*supra*, p. 55), it is very interesting to learn that he has now, fortunately, obtained such authentic information of the Wild Cat being a native, that he says:—"These are so authentic, that I cannot think the fact can any longer be doubted." I am sure that all Irish naturalists will be exceedingly gratified at Major Barrett-Hamilton's success in thus solving this long doubted question. But it would add greatly to their pleasure and gratification if he would kindly, in the next issue of the *Irish Naturalist*, give the names of the publications from which he gathered this important fact, and not withhold them until the publication of his work on British Mammals, in which I wish him every success.

ROBERT WARREN.

Ardnaree, Monkstown, Co. Cork.

The Ringed Seal in Irish Waters.

Mr. Lydekker kindly drew my attention to an important point of difference between the skulls of the Ringed Seal (*Phoca foetida*) and Common Seal (*P. vitulina*) which I had omitted in my "Notes on Irish Seals" in last month's *Irish Naturalist* (p. 42, *supra*). It is the shape of the lower jaw. The two branches or rami of the lower jaw unite in the middle by what is called a symphysis. The latter is longer in the Ringed Seal than in the other seal, and the branches before they join run almost parallel to one another for a certain distance before they diverge. In the Common Seal the branches of the lower jaw are devoid of that peculiar notch and join almost like the two sides of a triangle. The jaws are also much more massive than those of the Ringed Seal. Altogether it should not be difficult to recognise the Ringed Seal from the jaws alone.

R. F. SCHARFF.

National Museum, Dublin.

NEW IRISH APTERYGOTA.

BY PROF. GEO. H. CARPENTER, B.SC., M.R.I.A.

DURING the year 1910, I received from Mr. James Strachan of Ballyclare, Co. Antrim, a springtail and a bristletail, both of which are additions to the known Irish fauna. The latter has indeed been probably introduced by commerce. The former, however, is doubtless indigenous, and apparently represents a species new to science. Students of Irish insects are much indebted to Mr. Strachan for having brought these interesting creatures to light.

THYSANURA.

LEPISMATIDAE.

***Thermobia domestica* (Packard).**

Specimens of a "fish-insect," evidently distinct from the "silver-fish" *Lepisma saccharina* (Linn.) commonly found in houses, were received in November from Mr. Strachan. At first I believed the specimens to belong to the Mediterranean *Ctenolepisma lineata* (Fab.), but examination of their structure shows that they are rather small examples of *Thermobia domestica* (Packard), another lepismatid whose original home is probably the Mediterranean region (Escherich, '04), but which has become widely disseminated by artificial introduction in Great Britain, Europe, Asia, and North America. The genus *Thermobia* can be recognised by the elongate maxillary palps, which, in *T. domestica*, have six segments, whereas the usual number in the family is five. The feelers, legs, cercopods, and ovipositor are also of exceptional length in *T. domestica*.

Application to Mr. Strachan for information as to the probability of the introduction of the species, drew from him some interesting notes on its occurrence and habits which I am glad to have the privilege of quoting here. He writes:—

"This insect occurs on the premises of a paper-mill in Ballyclare. I have observed it for over five years, but took little notice of it until lately when I became interested in the structure of the scales from similar insects. *T.*

domestica frequents warm places where the temperature is between 70° F. and 80° F., and shuns damp cold places. Its favourite habitat is in the interstices of stone walls warmed by their proximity to steam-pipes and in a similar situation between wood-skirting and stone walls. It lives and breeds in dark places, emerging from the latter only when in search of food. For this reason apparently its eyes are of no use to it in daylight, as it is not sensible to the presence of objects brought suddenly very close to it. A very bright light however disturbs it. It appears to feed on starch, dextrine, paste, bread-crumbs, &c. It has a cannibal nature however which the following incident would tend to prove. I placed three of the insects in a shallow glass beaker. One of them was slightly crushed. The other two I asphyxiated with a drop or two of ether. One of the latter insects was thus killed, but the other revived after a time. The beaker was left overnight and in the morning the live insect had apparently devoured the crushed one, for the latter was lying in pieces, literally 'cleaned out' like an empty shell. It did not touch the complete dead insect, however, but frequently walked round and over it as if examining it.

"The only foreign material at present in use in the mill comes from the Baltic, and is of a nature that would forbid the presence of insect life. Sixteen years ago, however, Spanish esparto was used but has not been imported since that time. Therefore if introduced, *T. domestica* must have been introduced then, and it has since become thoroughly used to its surroundings. A friend (whom I have proved to be rather an accurate observer) tells me that he saw the same insect many years ago in a corn-mill at Ballymena. Unfortunately the corn-mill in question does not now exist, having been burned down. Of course the atmosphere in a corn-mill near and around the kiln is often very warm—over 80° F. I recently paid a visit to a neighbouring corn-mill but could detect no sign of any kind of animal life—not even a cricket. Another interesting point lies in the fact that seventy years ago a corn-mill stood on the spot where the insect is now found. In conclusion I may mention that *T. domestica* is fairly

numerous in summer but disappears almost entirely in the winter."

Probably we shall be right in regarding *T. domestica* as an introduced species in Ireland as in Great Britain. But there is the possibility that a Mediterranean insect like this may be an indigenous species in our island, although it is now almost or altogether confined to the interior of buildings. In Great Britain *T. domestica* has usually been found in bake-houses, where its fondness for stoves, ovens, hot-water pipes, and other warm objects has earned for it the name of the "fire-brat."

COLLEMBOLA.

ENTOMOBRYIDAE.

Proisotoma ultonica, sp. nov.

Body plump and thickset, with short appendages. Feeler hardly longer than head (fig. 1). Post-antennal organ elongate oval, as long as twice the diameter of an anterior ocellus; eight ocelli on each side, the outer median two very small (fig. 2). Foot with simple elongate claw; empodial appendix bristle-like, half as long as claw, with small, but distinct lamina (fig. 3). Catch exceptionally large (fig. 4) with a stout, curving bristle on its base and four teeth on each limb. Fourth abdominal segment nearly $1\frac{1}{2}$ times as long as third (fig. 1). Spring (figs. 1, 5, 6) with manubrium as long as dens and mucro together; dens with numerous small tubercles; mucro more than half as long as dens, with two upturned teeth—one apical and one sub-apical—and an evenly curved lamina (fig. 6).

Length, 1.1 mm. Colour, light grey, the tergites, head, and feelers with dark-blue mottlings; legs with fainter mottling.

Habitat—Ballyclare, Co. Antrim; in garden soil.

A very large number of specimens of this curious little springtail were sent by Mr. Strachan in April, 1910. They were present in large numbers in garden soil around the roots of cauliflowers. I cannot satisfy myself that they were actually eating the roots, though serious damage by various species of Collembola to vegetable tissues of different kinds has become more and more apparent during recent

years (see Theobald, '10, pp. 111-127). It is certainly remarkable that an insect new to science should have been discovered for the first time in such enormous numbers.

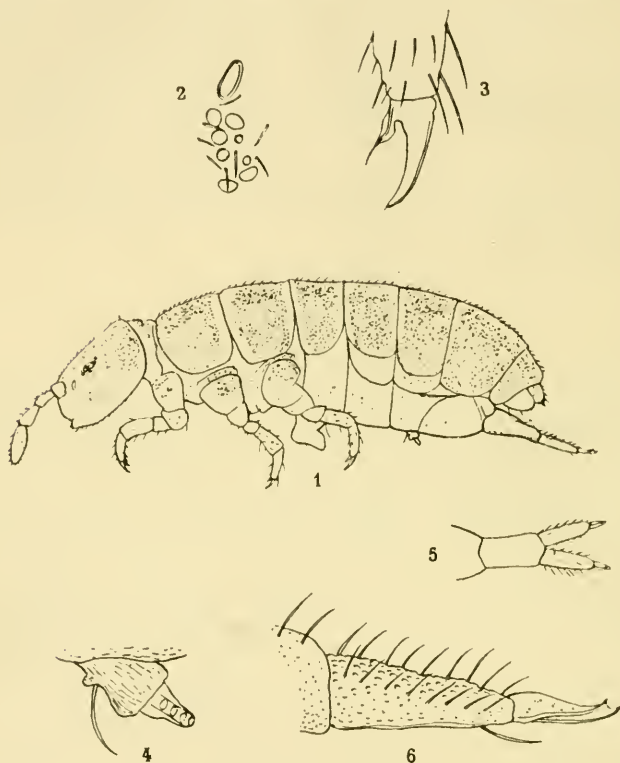


Fig. 1, *Proisotoma ultonica*, side view, $\times 60$; fig. 2, ocelli and post-antennal organ of right side, $\times 350$; fig. 3, foot with claw and empodial appendix, $\times 600$; fig. 4, catch, $\times 600$; fig. 5, spring, dorsal view, $\times 60$; fig. 6, dens and mucro of spring, side view, $\times 350$

A few years ago, this springtail would have been included in the comprehensive genus *Isotoma*. Now, the six distinct abdominal segments, the simple sensory bristles, the short spring with relatively large or elongate mucro, characterize the genus *Proisotoma* of Börner ('03, p. 171). We already know *P. Schötti* (Dalla Torre) from the west coast of Ireland, and the species of *Proisotoma* have a curious and interesting discontinuous range in the Arctic Regions, the British Isles, North and South America, and the Antarctic.

The present insect is abundantly distinct from *P. Schötti*, and from all the longer-known species of the group. Its nearest European ally is *P. borealis* (Axelson, '05, p. 791), a Finnish species with a comparatively short and thick body, a narrowly elliptic post-antennal organ; the fourth abdominal segment half as long again as the third, and a very well-developed catch. In *P. borealis*, however, the ocelli are all of equal size, the empodial appendix has no bristle-like ending, and the mucro is short and stout. Axelson calls attention to the likeness which his *P. borealis* bears to a tropical species from a very distant part of the world.—*P. inaequalis* (Schaeffer, '99, p. 403, figs. 4, 5), found in the islands of the Bismarck Archipelago. Curiously our Irish insect is still closer to *P. inaequalis*, whose spring, as figured by Schaeffer, might almost have been drawn from the Ballyclare springtail; the mucro in the latter is, however, relatively longer, though of closely similar shape. *P. inaequalis* is a very small springtail, only 75 mm. long. Its ocelli are all of equal size, and the disproportion in the relative lengths of the fourth and third abdominal segments, (as 5 : 3) which gives the species its name, is greater than in *P. ultonica* (as 3 : 2).

This discovery of another Irish species of *Proisotoma*, showing such noteworthy and unexpected affinities with both arctic and tropical springtails is of quite exceptional interest. It supports strongly the view that our apterous fauna is of a relatively high antiquity, and presages still more remarkable results when that fauna shall be more thoroughly known.

Royal College of Science, Dublin.

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REVIEW.

BRITISH AND IRISH MAMMALS.

A History of British Mammals. By GERALD E. H. BARRETT-HAMILTON, B.A. (Cantab.), M.R.I.A., F.Z.S. With 27 full page plates in colour, 54 in black and white, and upwards of 250 smaller illustrations, drawn by Edward A. Wilson, B.A., M.B. (Cantab.). London: Gurney and Jackson. (Parts I. to IV. October, 1910, to February, 1911. Price, 2s. 6d. each).

Every zoologist whether professor, amateur or sportsman, will be gratified to see the above work commenced by such a competent naturalist as Major Barrett-Hamilton. Bell's "*History of British Quadrupeds*," edited in 1874 by Toms and Alston, has for over 30 years been looked upon as the best available book of reference on this subject, notwithstanding its age and the larger and more costly volumes since written by others, who can scarcely claim to have really studied the subject. Barrett-Hamilton, on the other hand, has devoted himself for years to the study of Mammals generally and the Rodents in particular, both in the museum and as a field naturalist, at home and in distant countries.

His work is intended to be completed in 21 parts to be bound in three volumes, and on looking over the four parts now under review, and just published, one is inclined to ask whether too much has not been attempted. Perhaps the scheme is too elaborate, for, in the preliminary notice it is stated, "no such work has ever been written or attempted in the English language," and in this connection one is inclined to recall the Shakesperian warning against "vaulting ambition."

Roughly speaking, there are 70 British land and aquatic Mammals, and, in the four parts issued only 8 have been completely dealt with in 208 pages. This shows the exhaustive character of the book and the value given for the modest subscription of 2s. 6d. each part. Copious references prove that the author was educated in a bibliographical atmosphere, and one would sometimes imagine that his old master, the late Professor Newton of Cambridge, was at his elbow when discussing questions in nomenclature.

The author tells us that at first he merely intended to produce a new edition of Bell's "*Quadrupeds*," but the idea had to be abandoned, and, the entire work is brand new. It will be divided into three sections—the first dealing with Bats or Flying Mammals, the second with the Land Mammals, and the third with the Aquatic Mammals, which in this case are all marine. The following points are dealt with under each species:—Synonymy, Local Names, Distribution in space and time, Gestation, Description and Anatomy where it illustrates specific difference or variation, Habits, &c.

The illustrations drawn by Dr. Wilson, of antarctic fame, are numerous and good. Amongst the coloured ones may be mentioned, the Hare skins in Part ii., where the difference in size and colouration between

the Scotch and Irish Hare is well shown, and Natterer's Bat in Part iii. is a well designed picture of light and shade, but there is, perhaps, too much colour in the plates of the Dormouse and the Noctule. Part iv. ends with the Long-eared Bat, the letterpress of which is still unfinished.

The work on the eight species of Chiroptera, already dealt with, is described by a well-known naturalist as "splendid." The author has largely drawn on the contributions of Irishmen—Kinahan, Alcock, &c.—and in a conspicuous degree from the careful and suggestive observations of Moffat, whose papers on the habits of our native bats are a remarkable tribute to his patience and ingenuity.

The labour bestowed by the author has been immense and the authorities are quoted with scrupulous care. Only two or three slips have been noticed. On page 30 of the Introduction, Rockabill is given as a light-station on the *west* coast of Ireland. In the table of dimensions, page 87, of Leisler's Bat, a specimen in the Dublin Museum from Co. Clare is referred to, whereas Clare is not given as an Irish locality on page 85, when dealing with the distribution of this species. On page 197, Charbonnier is given as the authority (the only one) for the weight, 5 grams (78 grains), of the Long-eared Bat. This must have been an abnormally light specimen as Moffat (*Irish Naturalist*, 1900, page 235) gives the weight as ranging from 100 to 130 grains.

Naturalists owe a debt of gratitude to the author for his courageous and successful effort to publish at immense labour a work, which, if completed on the same lines as the four parts issued, will remain for years without a rival as the standard authority on British Mammals.

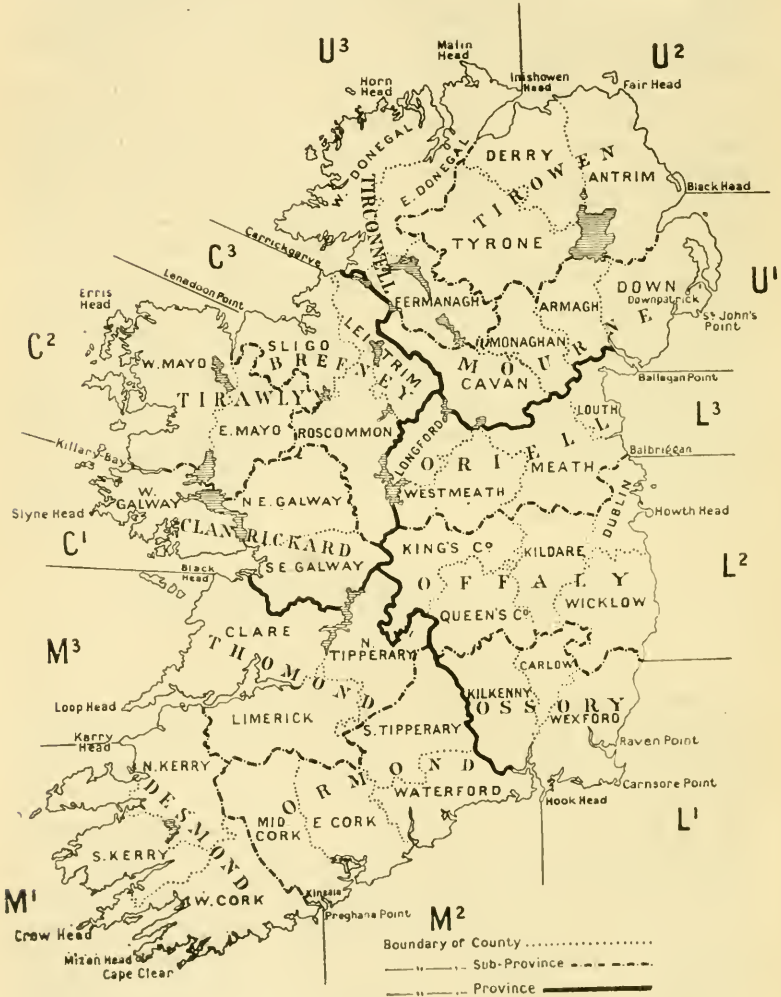
R. M. B.

A CENSUS OF IRISH CRYPTOGRAMS.

BY J. ADAMS, M.A.

A SHORT statistical summary of the number of species belonging to each of the great groups of flowerless plants found in Ireland, and of our present knowledge of their distribution up to the end of the year 1910, will, I think, be of interest to Irish botanists. A few years ago such a summary would not have been possible. However, the publication by the Royal Irish Academy during the years 1908, 1909, and 1910 of detailed lists of species of Algae, Lichens, and Fungi found in Ireland, together with the additions to each of these groups up to the end of the year 1910 enumerated in the pages of the *Irish Naturalist* for April, 1911, makes the task a comparatively light one in the case of the lower Cryptogams. As regards Liverworts

and Mosses I have relied on the figures given in the Moss Exchange Club's Census Catalogue of British Hepatics, published in 1905, and Census Catalogue of British Mosses, published in 1907. To complete the figures to the end of 1910 I have consulted the pages of the *Irish Naturalist* and



the British Association Handbook to the Dublin District, 1908. For Characeae and Vascular Cryptogams I have relied on Praeger's Topographical Botany, 1901, and the

Supplement for 1901-1905, and additional information published since in the *Irish Naturalist*.

Such a stocktaking might well be made every five or at least every ten years and would show what progress has been made in the past, and at the same time indicate to students of geographical distribution what parts of the country would best repay investigation in the future. The present time, when the first ten years of the century have been completed, seems opportune for such a review, especially in view of the fact that the results of the biological survey of Clare Island and neighbourhood will shortly be published and the additions made to our knowledge of the flora of Ireland in general, of Connaught, and of Mayo as a result of that survey will be better appreciated.

In the summary of distribution of species I have adopted the divisions of the country into provinces and sub-provinces proposed by me in the *Irish Naturalist* for August, 1908, and January, 1909. The boundaries of these divisions may be seen at a glance on the accompanying map which is reproduced by the kind permission of the Royal Irish Academy.

The figures in each group for the sub-provinces, the provinces, and for the whole of Ireland are given in the subjoined tables (pp. 90-92).

A glance at these figures will show that very little is still known of the cryptogamic flora of half the area of Ireland. It would scarcely be prudent, however, to draw any further conclusions. Of the four provinces the largest number of species appears to be possessed by Leinster. This is doubtless due to the fact that the district around Dublin has been better investigated than other parts of Ireland, just as Ulster has the priority in Mosses for the obvious reason that two of the most eminent bryologists live in that province. Munster has the largest total of Lichens and Liverworts at present. In the case of Lichens the priority may pass to Connaught when the Clare Island investigations are completed. But it would be idle to speculate at present as to what Province possesses the largest Cryptogamic Flora.

I. FRESHWATER ALGAE.	M ₁	M ₂	M ₃	C ₁	C ₂	C ₃	L ₁	L ₂	L ₃	U ₁	U ₂	U ₃	Mun-ster.	Con-naught.	Lein-ster.	Ulster.	Ire-land.
Flagellatae ..	8	0	0	6	3	0	0	0	0	0	6	0	8	6	0	6	15
Peridinieae ..	4	0	0	4	2	0	0	0	0	0	5	0	4	5	1	5	10
Diatomaceae ..	135	46	13	112	102	12	35	195	42	147	146	102	150	147	206	196	281
Cyanophyceae ..	46	18	1	40	32	0	1	96	3	34	41	42	61	55	98	86	163
Desmidiaceae ..	291	12	1	343	144	0	0	278	19	167	136	275	293	360	282	323	499
Other Conjugatae ..	5	7	0	6	0	0	0	26	1	3	4	5	13	6	26	9	35
Chlorophyceae ..	63	26	6	84	33	0	2	145	8	43	67	76	88	96	146	118	249
Rhodophyceae ..	4	1	1	3	0	0	0	10	0	3	4	2	4	3	10	6	11
Total ..	556	110	22	598	316	12	38	750	73	397	409	502	621	678	769	749	1263
II. MARINE ALGAE																	
Flagellatae ..	1	0	0	0	0	0	1	0	0	1	0	0	1	0	1	1	1
Silicoflagellatae ..	2	0	0	0	0	0	1	0	0	2	0	0	2	0	1	2	2
Coccosphaerales ..	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	1
Peridinieae ..	16	0	0	0	0	0	20	7	0	15	0	0	16	0	23	15	24
Diatomaceae ..	66	39	112	115	48	8	89	233	15	80	68	10	178	131	275	133	401
Cyanophyceae ..	2	10	11	6	1	0	2	30	0	6	5	0	18	7	29	10	31
Chlorophyceae ..	23	33	19	23	3	0	11	49	0	16	32	1	49	27	55	44	80
Phaeophyceae ..	50	69	28	36	13	0	18	73	0	21	54	3	85	48	74	65	121
Rhodophyceae ..	110	107	80	94	18	2	32	160	0	72	104	9	162	103	163	144	231
Total ..	270	258	250	274	83	10	175	552	15	213	263	23	511	316	622	414	892
III. CHARACEAE ..																	
Total ..	12	8	9	12	9	10	10	11	12	10	7	9	13	13	17	11	20

	M ₁	M ₂	M ₃	C ₁	C ₂	C ₃	L ₁	L ₂	L ₃	U ₁	U ₂	U ₃	Mun- ster.	Con- naught.	Lein- ster.	Ulster.	Ire- land.
IV. LICHENES ..	429	267	88	466	32	8	31	183	10	174	186	12	525	481	199	297	780
V. FUNGI.																	
Myxomycetes ..	5	14	0	10	1	0	0	51	5	8	16	1	17	10	52	20	61
Phycomycetes ..	3	6	0	1	1	0	0	35	3	5	5	0	8	2	36	9	47
Hemiascomycetes ..	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	2
Eusascomycetes ..	27	90	3	24	0	1	4	235	24	72	83	4	109	25	241	126	346
Hemibasidii ..	0	3	0	2	1	0	0	8	3	3	2	1	3	4	11	5	13
Protobasidiomycetes	15	41	0	27	0	0	0	88	28	46	32	0	46	27	91	56	107
Autobasidiomycetes	166	174	1	23	1	1	1	550	66	243	182	1	290	24	557	324	712
Fungi Imperfecti ..	6	16	1	7	0	1	3	142	8	16	10	2	23	7	145	26	185
Total ..	222	344	5	94	4	3	8	1110	137	393	330	9	496	99	1134	566	1473
VI. HEPATICAE.																	
Marchantiales ..	9	6	4	5	3	3	2	9	4	7	10	7	11	6	9	11	13
Jungermanniales ..	144	83	44	78	105	57	44	115	44	105	89	94	146	120	115	130	162
Anthocerotales ..	2	1	0	0	1	0	1	1	0	1	1	1	2	1	1	1	2
Total ..	155	90	48	83	109	60	47	125	48	113	100	102	159	127	125	142	177

VII. MUSCI.	M ₁	M ₂	M ₃	C ₁	C ₂	C ₃	L ₁	L ₂	L ₃	U ₁	U ₂	U ₃	Mun-ster.	Con-naught.	Lein-ster.	Ulster.	Ire-land.
Sphagnales (after Warnstorff).	14	12	8	14	15	2	7	14	5	24	18	24	17	17	18	28	29
Andrales	4	3	0	3	2	2	1	4	2	4	3	3	4	4	4	4	4
Acrocarpi	195	185	93	112	103	95	70	225	108	205	227	174	246	166	231	258	304
Pleurocarpi	98	80	64	62	56	55	48	90	54	89	94	80	104	89	97	102	120
Total	311	280	165	191	176	154	126	333	169	322	342	281	371	276	350	392	457
VIII. FILICALES.																	
Marsiliaceae	1	0	0	1	0	0	0	0	0	0	1	0	1	1	0	1	1
Ophioglossaceae	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Hymenophyllaceae	3	3	3	2	2	2	2	1	2	2	3	3	3	2	2	3	3
Osmundaceae	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Polypodiaceae	23	20	22	23	22	24	18	22	20	21	21	24	25	24	22	24	26
Total	30	26	28	29	27	29	23	26	25	26	28	30	32	30	27	31	33
IX. EQUISETALES	8	7	8	8	7	8	6	7	7	6	9	8	8	8	7	9	9
X. LYCOPODIALES.																	
Lycopodiaceae	3	3	1	4	4	3	2	3	2	3	3	3	4	4	3	3	4
Selaginellaceae	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Isotaceae	1	1	0	1	1	1	0	1	0	1	1	1	1	1	1	1	1
Total	5	4	2	6	6	5	3	5	3	5	5	5	6	6	5	5	6
Total of all Cryptogams.	1998	1394	625	1761	769	299	467	3102	499	1659	1679	981	2742	2034	3255	2616	5110

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Slow Loris and a Bengalese Cat from Mr. C. G. Rogers, a young Serval from Capt. T. Crean, Badgers from Messrs. J. C. Bagot and J. Grocock, a Cave Rat from Dr. Garland, Rabbits from Mr. H. Sanderson, a Red and Blue Macaw from Mr. F. D'Arcy Thompson, a Red-breasted Merganser from Mr. P. Gleeson, twelve Sheldrake from Mr. R. M. Barrington, Mr. H. B. Rathborne and Mr. W. J. Williams, a Wild Duck from Mr. M. L. Hearn, and a West African Python from Sir Philip C. Smyly.

The three American Black Bears have lately been placed in the large open den near the pit where the Polar Bear and Syrian Bear are kept, so that all the bears in the gardens are now close together and are shown to great advantage. Two small cages with wire fronts in the apse of the Roberts House have been completed, and are now occupied by a pair of young Caracals. These animals were at first much alarmed at the proximity of their large relations, the Lions and Tigers, but they are now quite contented and peaceful. The new Sheldrakes have been placed in the old seal-pond, where they make a very attractive display.

DUBLIN MICROSCOPICAL CLUB.

MARCH 8.—The Club met at Leinster House, A. R. NICHOLS, M.A. (President) in the Chair.

Dr. G. H. PETHYBRIDGE exhibited "spore"-bearing pure cultures of the potato-blight fungus (*Phytophthora infestans*) growing saprophytically on an agar medium prepared from an extract of Lima bean seeds. The cultures had been received from Professor L. R. Jones, of the University of Wisconsin, U.S.A. It is only in recent years that complete success has attended the efforts made (largely in the United States) to cultivate this eminently parasitic fungus in an artificial medium, but that it retains its virulence as a parasite when grown under these conditions was evidenced by the fact that cut-slices of living potato-tubers, which had been inoculated from the pure cultures received from America, and which were exhibited, had become typically affected with "blight," and were producing a plentiful crop of mycelium "spores." He also showed the parasitic fungus *Sclerotinia* (*Monilia*) *cinerea* Schröt., causing serious damage to a cherry tree from King's Co. This is the second record of this fungus in Ireland, it having previously obtained on plums from Co. Antrim. (*Irish Nat.*, vol. xix., 1910, p. 79).

G. P. FARRAN showed a specimen of the pelagic copepod *Aegisthus mucronatus*, from the west coast of Ireland. The species is remarkable for the great length of the furca, the branches of which are very slender, fused together, and about four times as long as the rest of the animal.

Prof. G. H. CARPENTER showed *Acrotelsa collaris*, Fab., a large tropical lepidematid bristle-tail from the Seychelles. Under the microscope, he demonstrated a dissected ovipositor, calling attention to the series of strong blunt teeth on the inner aspect of the paired genital processes.

DUBLIN NATURALISTS' FIELD CLUB.

FEBRUARY 24.—The Vice-President, W. F. GUNN in the chair. The second discussion on problems raised by the Clare Island Survey was opened by R. SOUTHERN, who read a paper on the "Marine Biology of the Clare Island District." The paper was illustrated by diagrams and maps, showing the distribution of the various elements in the marine fauna. The effects of such environmental conditions as ocean currents, the salinity and temperature of the sea-water, the nature of the sea-bottom and of the materials composing it, the food supply, &c., were considered, and special importance was attached to the pelagic stage in the life-history of marine animals, as a dominant factor in their dispersal. The fauna was analysed into its component geographical elements, four groups being recognised, viz., the Cosmopolitan, the Boreal, the Celtic, and the Lusitanian. The proportions of these groups on the west and east coasts of Ireland were compared, and an attempt was made to trace the origin and history of the littoral and shallow-water fauna of the Irish coasts. A discussion ensued, in which the following members took part:—Prof. G. H. Carpenter, R. Ll. Praeger, G. H. Pethybridge, J. de W. Hinch, A. R. Nichols, and N. Colgan.

Alexander M'Henry, M.R.I.A., and D. R. Pack-Beresford, D.L., M.R.I.A., were elected members of the Club.

APRIL 11.—R. LLOYD PRAEGER in the chair. The final discussion on problems raised by the Clare Island Survey was opened by Dr. R. F. SCHARFF, who dealt with the terrestrial fauna. Attention was directed to the poverty of the Clare Island fauna among the Mammalia and other groups as compared with the mainland, and the explanation given by Moffat of the readiness with which certain species isolated on small islands might become exterminated was mentioned. No doubt could be entertained that the majority of the animals inhabiting Clare Island had made their way thither over a land connection, and the same conclusion must be drawn with regard to the immigration of animals into Ireland from Britain or the Continent. Clare Island, as an isolated part of the West, afforded an object lesson in the mixture of northern and southern forms of life that is characteristic of our Atlantic coast. The southern (Lusitanian) element in the Irish fauna, especially marked as it was along the west coast, was shown by the discontinuous range of its members to be the most ancient element; perhaps as Edward Forbes had long ago suggested for the Lusitanian plants, some species might have survived in our area since Miocene times. The question of survival through the Glacial Period raised many difficulties and apparently serious differences of opinion between biologists and geologists, but the evidence afforded by animal and plant distribution must be allowed its full weight. The presence of North American animals and plants in western Ireland supported the theory that a land connection stretched north of the Atlantic by way of Norway and Greenland; the warm waters of the Atlantic thus cut off from the Arctic regions might have ensured a comparatively mild climate along the old Continental coast-line to the west of our present western Irish shore, even during the Glacial Period.

W. B. Wright, T. Hallissy, C. B. Moffat, J. N. Halbert, J. de W. Hinch, G. H. Carpenter and the Chairman took part in the discussion. The geologists dwelt on the evidence for severe glaciation up to, and even beyond the western shore, but suggested the possibility of an unglaciated area to the south. It was pointed out in reply that the discontinuous range of the southern animals could be more easily explained by their survival in an area to the west.

APRIL 8.—EXCURSION TO THE DUBLIN MOUNTAINS.—Conducted by W. B. WRIGHT, a large party traversed the Dublin range from Mountpelier to the Scalp, visiting on the way the high-level shell-bearing Glacial gravels at Ballyedmonduff and Larch Hill that have become famous through the researches of the late Rev. Maxwell Close and J. de W. Hinch. After the long walk, tea at the Scalp was welcome, and the party returned to town by train from Carrickmines.

NOTES.

ZOOLOGY.

Trichoniscus Stebbingi in Down and Antrim.

In company with Messrs. A. W. Stelfox and R. Welch, I recently searched some greenhouses in Hillsborough (Down), also in Botanic Park and Crawford's Nursery, Belfast (Antrim), when we were successful in finding in each of these places *Trichoniscus Stebbingi*, Patience. This species of Woodlouse had previously been found in Ireland only in the greenhouses at the Royal Botanic Gardens, Dublin.

In addition to the above, the greenhouses in Botanic Park yielded the following species of Woodlice:—*Trichoniscus pusillus*, *T. roseus*, *T. pygmaeus*, *Oniscus asellus*, *Porcellio scaber*, *P. dilatatus*, *Metoponorthus pruinosis*, and *Armadillidium nasatum*, as well as two species new to Ireland, particulars of which will be recorded in a subsequent issue.

NEVIN H. FOSTER.

Hillsborough, Co. Down.

The Nuthatch in Ireland.

On the 26th March, standing in Mr. Trumbull's garden at Malahide, I heard the strange note of a bird, in one of the apple trees. Following the sound I saw what I thought was a Nuthatch (*Sitta caesia*). The bird flew across the garden to another apple tree. By careful stalking I examined within a few paces the *first* Irish Nuthatch, noting the black streak across the eye, the back and head bluish grey, the short tail and reddish under plumage. Mr. Trumbull kindly offered to shoot the bird, but I thought it was unnecessary, as I was absolutely certain of the species. Since then I have had a letter saying the bird is still about the garden.

W. J. WILLIAMS.

Dublin.

Irish Mammals.—A Correction.

Mr. R. Warren writes to correct a slip in his note on the Wild Cat published in last month's issue (*supra*, p. 80). The Arctic "Marmot" mentioned should, of course, have been the Arctic Lemming (*Cuniculus torquatus*).

GEOLOGY.

A Post-Glacial Lake Deposit.

Last summer I had an opportunity of investigating a shell marl which occurs in a hollow to the south of the "white limestone" escarpment at Megaberry, near Moira. My attention was first drawn to this by Mr. John Hull who had discovered it whilst engaged in draining operations in that part of his farm.

As the area is now intersected by ditches, and the deposit situated at no great distance from the surface, it was easy to make holes with a spade at different points along these drains and so find the limits of the lake.

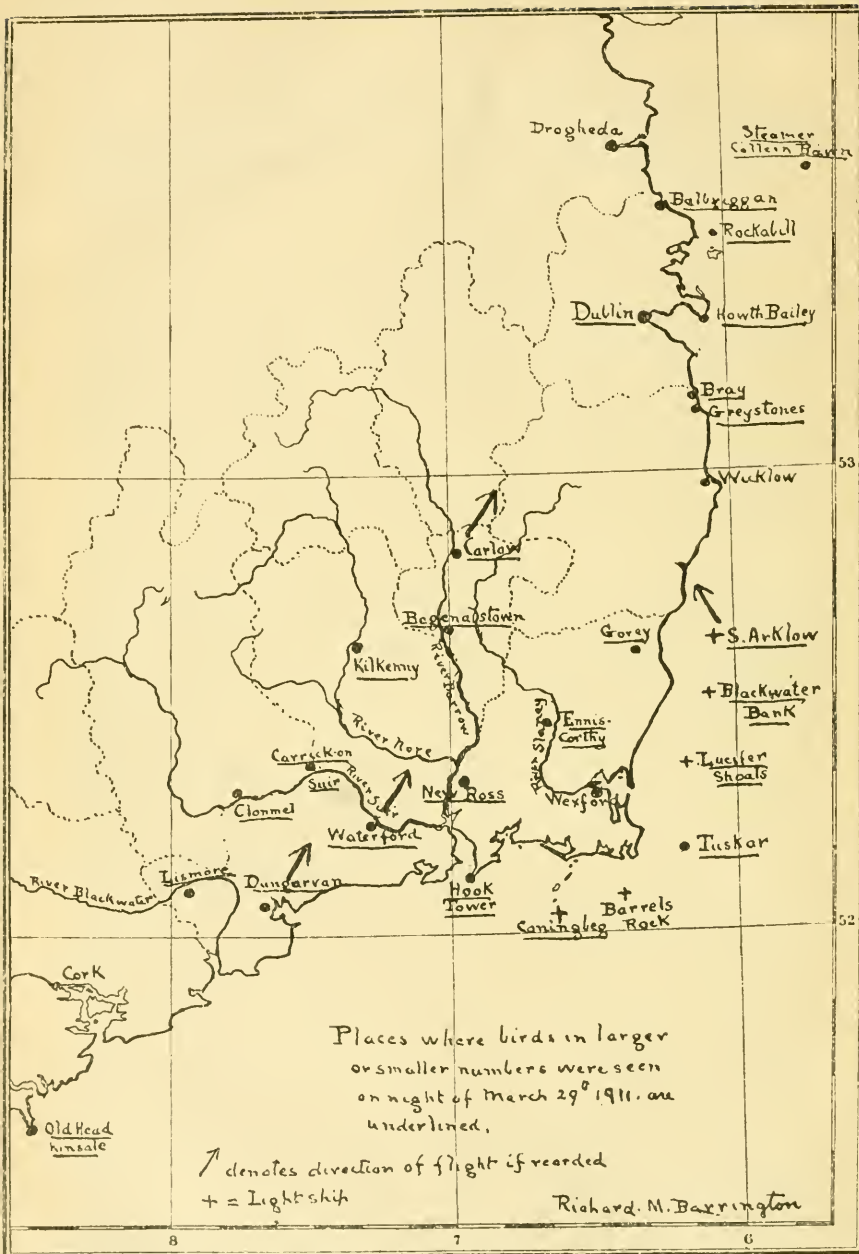
Thirty-five holes were thus dug, and from the tabulated results the following more generalised statements can be made. The upper deposit varies from 2 to 3 feet in depth, and consists of a dark clay yielding towards the surface to a dark peaty soil. Below this in the centre of the area is the marl deposit. This varies from $\frac{1}{2}$ inch to 10 inches. Towards the margin the marl is replaced by flint and limestone gravel. Blue clay of from 2 to 6 inches in thickness is usually found below the marl, but is absent where the gravel occurs. The lowest layer is a red clay, which in most places is of good quality and suitable for brick making. At several points this is replaced by a red loam.

The shells found in the marl are common freshwater types—*Valvata (cristata?)*, *Limnaea peregra*, and *Pisidium (glaber?)* were obtained.

The general sequence of events would seem to be as follows:—After the removal of the ice which covered the whole of the North of Ireland boulder-clay was left in irregular mounds. Arranged in the form of a semicircle with the limestone escarpment as diameter a natural reservoir was formed. Into this the fine clay was washed down. Then came a period in which molluscs invaded our lakelet. Their broken and comminuted shells mixed with clay formed the deposit of marl. While this was going on the lake sought an outlet where a rift occurred in the curve of mounds at the south-east, and eventually, owing to the deepening of the bed of this issuing stream, the impounded lake escaped to one of the feeders of the Lagan. After this the accumulation of hill-wash still continued, giving us a further deposit of clay, and then bog plants laid hold of the surface and peat was formed. Last of all artificial drainage has greatly improved the land, the marsh has disappeared and fertility is once more established.

ISAAC SWAIN.

University College, Cork.



Map to illustrate great bird rush of March 29th-30th, 1911, prepared by R. M. Barrington.

THE GREAT RUSH OF BIRDS ON THE NIGHT OF
MARCH 29TH-30TH, AS OBSERVED IN IRELAND.

BY R. M. BARRINGTON, M.A.

ON the night of March 29th, a great rush of birds was observed in several towns of S. E. Ireland, and also at some light-stations along the coast from Balbriggan to the Old Head of Kinsale.

Newspapers, for a week or more afterwards, contained accounts of extraordinary flights, and, probably, the most convenient method of illustrating what occurred, is to give extracts from private letters lent chiefly by my friend, Mr. R. J. Ussher, and reports from newspaper correspondents.

I interviewed the light-keepers at Balbriggan and Rockabill, and some of the seamen who were on board the lightships at Blackwater Bank, Lucifer Shoals, and Coningbeg.

Information was also received from Howth Bailey, the Tuskar, South Arklow light-ship, Barrels light-ship, Hook Tower, and the Old Head of Kinsale.

As regards the towns, most birds appear to have been noticed at New Ross, Waterford, Carlow, Kilkenny, Carrick-on-Suir, and Dungarvan. Smaller numbers were observed at Clonmel, Bagenalstown, Lismore, Enniscorthy, Gorey, Greystones, and Bray.

Mr. C. B. Moffat states that it was a "tremendous night of Curlew cries over Dublin."

Many species were reported, but Starlings predominated largely; then Curlew, Thrushes, Blackbirds, and Redwings; and after these, a heterogeneous collection of other species.

The relative numbers of each, as well as the variety, must be inferred generally from the reports of correspondents, few of whom were trained observers.

The specimens sent by the light-keepers are, of course, the best evidence. A list of these, received to May 20th, is given hereafter.

On the night in question, an exceptional number of birds was seen at the following light-stations:—Balbriggan, Rockabill, Howth Bailey, Arklow S. light-ship, Blackwater

Bank, Lucifer Shoals, Tuskar, Coningbeg, Hook Tower, and Old Head of Kinsale, extending along a coast-line of over 200 miles.

The following are extracts from letters, etc.

WATERFORD.—Mr. Peter Griffin writing on March 30th, says :—“ Last night, between ten and twelve, an extremely large number of birds was seen hovering round the city. The telegraph wires along the quay were full. Where there was any light in a window they were dashing against it. A post-office official opened a window and a number of birds flew in. A postman when cycling across the bridge said that the birds were so numerous that he was struck by them several times. Between four and five in the morning they appeared like a cloud which covered several miles, and *flew in a N.E. direction.*¹ Many remained about the city. Hundreds were found dead, especially along the quay. Those that were caught could only fly two or three feet. The majority were Starlings, but many were like the Thrush, and some Blackbirds. An Oyster-catcher was captured.”

Another WATERFORD correspondent, Mr. Friel, says :—“ Last night, March 29th–30th, about ten o’clock the Curlew were passing over the town and crying far more than usual. While the men were working at the new bridge with flare lamps many hundreds of Starlings came fluttering round. The birds were in thousands on the tarpaulins along the quay, opposite the post office. In addition to Starlings, I hear one Field-fare was found.”

NEW ROSS.—A correspondent of the *Freeman’s Journal*, writing on March 30th, says :—“ About ten o’clock, last night a swarm of Starlings, numbering several thousands, descended on the town, filling the streets, houses, and yards.

“ Numbers got into the houses, and broke the windows in their flutterings, whilst vast numbers dropped on the river Barrow, beside the gas-lights, and were drowned.”

A correspondent of the *Daily Express* at New Ross stated that :—“ The strange visitation of Starlings, which created such interest, continued, but in smaller numbers, till April 2nd, on the night of which several were killed.”

¹ The italics are in all cases mine.—R.M.B.

CARLOW.—A correspondent of the *Freeman's Journal* at Carlow reports that:—"On the night of March 29th the sky was almost obscured by vast numbers of Curlew and Starling, which were reinforced by Wild Duck, Blackbirds, Thrushes and Woodquests. The streets were practically littered in the morning with the bodies of dead birds." He also reports that a great multitude of Starlings was observed over Bagenalstown, which is also on the river Barrow, about twelve miles further south, and that on the following day a man ploughing in a field near the town, reported that Starlings were continually alighting on the plough, and on the horses.

Mr. Haughton, of Carlow, writes:—"I noticed the following birds dead on the morning of the 30th, Starlings and Redwings, the former in large numbers, and one Brambling, a rare visitor. About fifty birds were found dead on my premises. For a day or two afterwards I noticed large flocks of Seagulls and other birds about the locality. The migration evidently *came from the S.W.* judging by the position in which the dead birds were found. There were a few Wild Duck and other birds among them, but I think they joined the flocks as they passed over the country. Some accounts of the flight are much exaggerated."

KILKENNY.—An *Irish Times* correspondent writes on March 30th:—"It may interest some of your readers to know that during last night hundreds of birds of various kinds, Curlew, Thrush, Blackbird, Sparrow, etc., fell dead. The roads leading to Kilkenny and the market place in the city, were the places where they were most noticed, but even the surrounding fields had their quota."

CARRICK-ON-SUIR.—Mr. J. Ernest Grubb, writing on March, 30th, says:—"The bird migration has been most extraordinary here. Starlings, Cormorants, Herons, Curlew, Thrushes, Blackbirds, Snipe, Redwing, and Gulls. A man who lives on the bank of the Suir told me that at about eleven or twelve o'clock he was awakened by the screaming of birds, and dressed and went out, and in the light of a gas lamp saw eight or nine Herons, two dozen Gulls and Water-rails, and five or six Cormorants and

Curlew walking up and down the flat bank at the edge of the river, screaming piteously. They were all gone in the morning."

Mr. J. H. Power, of Carrick-on-Suir, says:—"About eleven o'clock last night flocks of birds began tumbling into the streets, some dead, and others not able to fly. I saw heaps of them to-day dead and all in good condition. One man told me he got twelve on the hearth in the morning which had tumbled down the chimney. The whole bird creation was astir and the people of the town were kept awake by the shriek of the Curlew, Duck and Snipe hovering over the town. *The birds were going N.E.* Starlings and Redwings were in masses; Thrushes, Blackbirds, Skylarks, Tit-larks, Snipe and an Owl were also picked up dead. The night was very dark. I distinguished the Redwing by the streaks about the head and brick colour under the wings. The Song Thrush has buff under the wing. For some days after Starlings and Redwings were feeding in the fields and quite weak." The wing of a Redwing was forwarded.

DUNGARVAN.—Mr. R. J. Brennan says:—"The night of the 29th of March was dark and calm until 10.30. Suddenly, before eleven o'clock, light rain and fog began, and flocks of Starlings were observed in the Square. They flew wildly about, as if terrified and bewildered, striking against windows, walls, and gas-lamps. On the morning of the 30th several dead birds were found. The night watchman states he saw the birds *departing in a N.E. direction.*"

Another Dungarvan correspondent says:—"I looked towards one of the gas lamps at eleven p.m. and the whole air seemed one mass of small birds."

LISMORE.—Mr. Fanning writes:—"On Wednesday, Thursday and Friday, the last three days of March, there was observable a state of excitement amongst birds, and particularly Starlings. On these nights Curlew were heard calling continuously over the town of Lismore. On Saturday night, April 1st, the air was full of them. The nights were dark and foggy, and the birds kept hovering over towns

where gas lamps were lighted. There are no gas lamps at Cappoquin, and no birds were observed there."

CLONMEL.—Mr. Burns, of the *Clonmel Chronicle*, reports :—"On the morning of March 30th a number of Starlings were found dead near St. Peter and St. Paul's Church, as if they had dashed themselves in the darkness against the spire."

The above extracts from letters and newspapers illustrate what happened over several inland towns. The bird-rush of March 29th was also observed at Enniscorthy, Gorey, Greystones, and Bray ; but the numbers at the three last-named towns were very small.

In order to show the number passing up the Channel, the following extract from the *Irish Times* of April 1st is of interest, as giving the experience of the captain of a steamer plying between Liverpool and Drogheda.

Captain Kirwin, who was in command of the L. & Y. Rly. Company's steamer, "Colleen Bawn," is reported to have said that :—"On the night of the 29th March about eleven o'clock, after crossing Drogheda bar, millions of birds joined the boat. Amongst them were a number of Curlew.

"On the following night coming from Liverpool, about twelve o'clock, large numbers of birds came on board and flew all round the steamer. They appeared very tired as if they had travelled a long distance, and did not know where to alight in the darkness. About three a.m. an enormous mass hovered round and perched on every part of the vessel, including the funnel. At 5.30 a.m., when thirty miles from the Irish coast, the birds flew in all directions from the steamer as if they were looking for land."

Turning now to the light-stations on the coast, the most northerly from which any special number of birds was reported is BALBRIGGAN.

Mr. E. A. Kennedy, light-keeper, at an interview, said :—"A rush of Starlings commenced at eleven p.m. on March 29th, and continued until four a.m. the next morning. Fifteen were picked up dead." This is a small mainland lighthouse at the end of the pier, and

Mr. Kennedy states that this was the only occasion during his six years residence that any birds were killed.

ROCKABILL.—Mr. Henry T. Murphy, light-keeper, when interviewed, said “the night of March 29th was dark; wind E.S.E. light, with drizzling rain, and that about 150 birds were killed, chiefly Starlings, one Woodcock, and one Manx Shearwater, and a large number of Blackbirds and Thrushes. Several Water-rail and Curlew were observed flying about.”

On March 31st I received from this station:—Four Woodcocks, one Snipe, one Meadow-Pipit, two Water-rail, one Dunlin; all said to have been killed on the night of the 30th. Possibly they struck on the previous night and were not found till the day after. Rockabill lighthouse is four miles from shore.

HOWTH BAILEY LIGHTHOUSE.—No report has yet reached me from the light-keeper, but the Secretary of the Irish Lights Board writes that the fog-siren was choked with dead birds on the night of April 1st.

No account has yet been received from three lightships, all situated about ten miles from shore, along the Dublin and Wicklow coasts, namely, the Kish, the Codlings, and North Arklow.

SOUTH ARKLOW.—Ten miles from the north Wexford coast. Mr. J. J. Reilly, light-keeper, writes:—“March 30th, Blackbirds, Starling, and Thrushes in large numbers about the ship all night; from 8 p.m. on 29th to 4 a.m. some hundreds striking, 40 killed. Wind light, N.E., hazy. March 31st, Blackbirds, Starling, Thrushes in large numbers about ship all night until 6 a.m. Wind light N.E., hazy. *Birds going N.N.W.*, 80 killed striking. The ship was covered with Starlings and Blackbirds on the morning of the 31st, and on April 1st Starlings in numbers rested on the ship, from 8 a.m. to 4 p.m., and then flew N.W.” Leg and wing of Water-rail received.

A “Chaffinch and Goldfinch” also seen. Two Goldcrests (leg and wing of one received) were killed striking on April 2nd, and in this connection it may be observed that two Goldcrests were forwarded from RATHLIN ISLAND, a lighthouse on the north coast of Ireland, on April 1st.

BLACKWATER BANK Lightship, ten miles from Wexford, sends:—1 Starling and 1 Thrush, killed on the 29th, also a Water-rail and Wheatear, the former of which died exhausted, and the latter struck the mast.

Patrick Cogley, A.B., said in an interview that he came on the watch at 4 a.m. on the 30th, and “never saw so many birds any night for thirteen years, ten to twenty Starlings were found killed, besides what fell overboard. Thrushes and Curlew were about the light, and two Wheatears, a Robin, and a few Linnets.”

LUCIFER SHOALS Lightship.—This station has not yet forwarded any specimens, but Patrick Magrath, A.B., who was on board on March 29th, says that the birds began to strike at 9 p.m. Wind light E., hazy. He was on duty until 4 a.m., and birds were coming the whole time. About 60 Starlings were killed, besides those which fell overboard, also two Blackbirds, a Thrush, and a few Skylarks.

TUSKAR Lighthouse.—Seven miles from shore. This is a famous light, off the extreme S.E. corner of Co. Wexford. Mr. A. O’Leary, the keeper, writes:—There was an enormous lot of Starlings on the night of March 30th; the rock and balcony were completely covered with them, and several hundreds were killed. There was also a lot of Thrushes and Blackbirds.” Mr. O’Leary forwarded a Red-wing, Wheatear, 2 Blackbirds, 1 Water-rail, 1 Black Red-start, and a Meadow-Pipit.

BARRELS Lightship.—Turning the corner of the south coast of Wexford, we come to this station, ten miles from shore, and here the testimony of Mr. Grant, the light-keeper, is most remarkable; for he states that “no birds were killed striking during the month of March, and no unusual flights were noticed.” This can only be accounted for by the fact that the sky must have been perfectly clear close to the ship on the night of March 29th.

CONINGBEG Lightship.—This is about fifteen miles west of the “Barrels,” and ten miles from shore. Matthew Murphy, siren-man, who was on the watch from 8 p.m. till midnight on March 29th, interviewed said—that in nine years he never saw so many birds, chiefly Starling, Blackbirds, and Thrushes. The only specimen, however,

forwarded was a Water-rail, killed striking on March 29th.

HOOK TOWER.—A light at the extreme end of a long narrow promontory extending in a S.W. direction at the mouth of Waterford Harbour. Mr. J. Devaney, the assistant keeper, writes, on March 30th.:—"I am forwarding a bird [Water-rail received] which struck the lantern this morning. Thousands of Starlings, Blackbirds, Thrushes, and Manx Shearwaters were around the lantern all night, and hundreds were killed. It was very dark and gloomy, and wind N.E."

OLD HEAD OF KINSALE.—After Hook Tower there are no south coast lighthouse records until we reach this mainland lighthouse, from which Mr. Martin Kennedy, light-keeper writes on March 30th, thus:—"I am posting to-day 6 Robins, 2 Skylarks, 2 Wheatears [all received.] They were killed at the lantern between 10 and 11.30 p.m. last night. It is most remarkable about the 6 Robins; I only remember getting one before—at Rockabill. 136 Starlings were found killed, or dying, this morning after the night, also 2 Shearwaters." On April 2nd Mr. Kennedy forwarded a Wheatear, Black Redstart, Stonechat, and Meadow Pipit, killed the previous night between 9 p.m. and midnight. He reports that the lantern and balcony were covered with hundreds of Starlings, but not one was killed. Wind light S.E., overcast, misty.

If the map of Ireland be consulted, it will be found that the distance from Balbriggan to the Old Head of Kinsale is about 180 miles, measured across country in a direct line: and that, with the exception of six towns situated along the Rivers Suir, Barrow, and Nore, namely, Waterford, Carrick-on-Suir, New Ross, Bagenalstown, Carlow, and Kilkenny, no *great* flight of birds was observed anywhere inland. Those seen at Lismore, Clonmel, Enniscorthy, and Gorey were comparatively few.

Some persons consider that the birds were departing from instead of arriving in Ireland. I think this view untenable, for, if one thing more than another stands out perfectly clear, it is that the great bulk of the birds which are observed at light-stations, are always making *for*, and not *from* the land. This conclusion is arrived at from

thousands of records collected during thirty years as to the direction of flight.¹ The paucity of specimens sent at the season of departure corroborates this. Why should the Jack Snipe, Dunlin, and Purple Sandpiper strike on the South coast of Ireland in spring? For they cannot be *southward* bound! Then, the Snow Bunting and the Brambling, which do not breed in Ireland, are killed striking long after those which have wintered with us have left. But the most convincing reason of all is the commonsense argument, why should birds select a misty night with fog for leaving Ireland? and why should they be found *exhausted* at lighthouses and lightships, on shore, or a few miles from shore?

Birds, like human beings, do not start on a journey under unfavourable conditions, if it can be avoided. On the contrary, they refrain from doing so, but they cannot tell, any more than we can, the meteorological conditions they are likely to meet with after a flight of 60 or 100 miles across the sea.

If the birds were leaving Ireland on March 29th, why is it they were not seen in Cork, Limerick, Dundalk, or Belfast? Why were the Starlings in these neighbourhoods quiescent?

A correspondent on the River Lee writes:—"No rush of birds was observed in this locality." Mr. R. W. Longfield says:—"No abnormal flight of birds was observed in the Bandon River or thereabouts." Mr. Kelly, postmaster at Youghal, says:—"No one has observed an inrush of birds on March 29th."

Surely portion of the Shannon valley would have been the natural route of Starlings from West of Ireland! And yet from Carrick-on-Shannon to Limerick, there is no report of any migration. Wherever the direction of flight is given it is totally at variance with the suggestion that the birds were *departing*.

Mr. Griffin says, between 4 and 5 in the morning they appeared like a cloud, which covered several miles, and flew in a N.E. direction from Waterford.

¹ See "The Migration of Birds as observed at Light-houses and Light-ships." London & Dublin, 1910.

Mr. Haughton, of Carlow, states the birds evidently came from the S.W., judging from the position in which the dead bodies were found. If that be so, they were clearly flying N.E.

Mr. Power of Carrick-on-Suir says the birds were going N.E. The night watchman at Dungarvan says they departed in a N.E. direction. The light-keeper at South Arklow lightship says the birds were going N.N.W. on the 31st.

It would be inexplicable if such an enormous mass of birds should collect along the S. and S.E. coasts, and then retrace their flight in a N.E. direction, if *leaving* Ireland.

If the birds were arriving, their distribution is easily accounted for. After crossing the mouth of the Channel, the coast of Wexford was first reached, and here the stream divided itself into two branches, one going up to the east coast, and the other along the south coast. Those which pursued the latter course soon arrived at the wide entrance to Waterford Harbour, up which many of them flew, and, following the line of least resistance, travelled along the valley of the Suir, to Waterford, Carrick, and Clonmel; others followed the Barrow, a tributary of the Suir, and arrived at New Ross, Bagenalstown, and Carlow. Others followed the course of the Nore, which joins the Barrow above New Ross, and reached Kilkenny. Those which overshot Waterford Harbour kept the coast-line until they reached Dungarvan Bay, and a few went up the Blackwater valley to Lismore.

The Old Head of Kinsale birds were probably a bewildered off-shoot of the main body, which became detached in mid-channel, and took a westerly direction. The Ennis-corthy birds came up the Slaney, and the few seen at Gorey probably did likewise.

The flocks seen ten miles from shore at Lucifer Shoals, Blackwater Bank, South Arklow, and along the coast at Balbriggan, came up-channel without touching Wexford at all.

But what is the reason that this great rush of birds took such a western route, and collected in such numbers? The solution of the problem is to be found in what may be

called a "combination of coincidences." The "Wonderful Battell of the Birds," described in the Cork Archæological Journal as having taken place between the 12th and 14th of October, 1621, may have been due to an analogous cause.

It is a well-known ornithological axiom that birds, in the Northern Hemisphere, usually breed in the most northerly portion of their range. Immense numbers annually towards the end of March move northwards through Spain and France to their breeding haunts. This year, for weeks previous to the 29th of that month, cold northerly or easterly winds prevailed over France and the British Isles, and birds though desirous to migrate were held back by the weather, and many species, which would otherwise have travelled separately, collected in the South of Europe like passengers at a railway station, anxious to proceed upon their journey, but unable to do so owing to a breakdown on the line.

To this cause I attribute the *extraordinary* number of birds, and as the temperature was much milder on the west coast of France and in Brittany than in central France, they took a more westerly course than usual, unwilling to face the bitter N.E. winds.

The following tables, compiled from the daily weather-charts, show the direction of the wind at the mouth of the Channel, and the fluctuations of temperature over central France for ten days previous to the 29th March.

In Table I. it will be seen that the wind was almost continuously N. or E., but that it suddenly changed to the S. at Valentia, Pembroke and the Scilly Islands on the morning of the 29th; and Table II. shows that the aggregate rises of temperature at ten French stations on that day amounted to 73 degrees, or an average of over 7 degrees at each station. This favourable change, coupled with a southerly wind in the mouth of the Channel, so to speak, liberated the birds, and as the wind still continued N.E. and E. over England, they decided to take a longer and more exhausting course than usual and travel towards Ireland and then turn N.E.

TABLE I.—DIRECTION OF WIND.

March.	20th	21st	22nd	23rd	24th	25th	26th	27th	28th	29th
Valentia ..	N.E.	Calm	Calm	E.	E.N.E.	E.N.E.	N.E.	N.E.	E.N.E.	S.S.E.
Pembroke ..	E.	N.E.	E.N.E.	E.	E.N.E.	N.N.E.	N.N.E.	N.N.E.	N.E.	S.E.
Scilly Is. ..	E.	E.N.E.	S.E.	E.S.E.	E.	N.E.	N.E.	N.E.	E.	S.E.

TABLE II.—DAILY FLUCTUATION OF TEMPERATURE.

March	20th	21st	22nd	23rd	24th	25th	26th	27th	28th	29th
C. Gris Nez	+3	+5	+1	—1	—7	—3	+2	+1	—4	+8
La Hève ..	+5	—4	—1	+4	—4	—5	—5	+5	—2	+8
Brest ..	+3	—1	+1	—2	—1	—4	—6	+5	+2	+5
L'Orient ..	+1	—0	—6	0	+2	—2	—7	+5	+1	+9
Rochefort ..	+4	—2	0	—2	—1	+1	—11	+1	+8	+6
Biarritz ..	—4	+1	—2	—2	+6	—7	—16	+4	+6	+9
Paris ..	+6	—2	+3	—7	+3	—10	—2	+2	+2	+6
Belfort ..	—4	0	+3	+2	—2	—2	—7	—3	+11	+5
Lyons ..	+5	—2	0	+1	+1	—2	—15	0	0	+13
Nice ..	—1	+7	+3	—2	+2	—7	—10	+2	+13	+4
Nett gain or loss =	+18	+2	+2	—9	—1	—41	—77	+22	+37	+73

Unfortunately for the birds, the change took place *exactly* on the last day of the last quarter of the moon, the very worst night, as far as darkness is concerned, that could have happened for the birds. (See “The effect of the Moon’s phases on the number of birds killed striking,” page 17 of my “Migration of Birds”).

Having crossed the Channel a bank of fog and drizzling rain was met with near the Irish coast, formed by the condensation of the moisture in the warm south wind when

it met the Arctic current, which had not yet ceased over England.

The weary travellers, believing that their journey was almost concluded and baffled and bewildered by the fog or mist which probably extended twenty or thirty miles from the Irish coast, were attracted by the lighthouse lanterns, and subsequently by the glare of the town lamps.

To Mr. C. B. Moffat I am indebted for various suggestions when writing this paper.

The species forwarded on the 30th and 31st of March, and on April 1st, from light-stations were :—

BIRDS FORWARDED.

ROCKABILL.—4 Woodcocks, 2 Water-rails, 1 Snipe, 1 Dunlin,
1 Meadow Pipit.

SOUTH ARKLOW.—1 Water-rail, 1 Wheatear, 1 Goldcrest.

BLACKWATER BANK.—1 Starling, 1 Wheatear, 1 Water-rail,
1 Thrush.

TUSKAR.—Redwing, Wheatear, 2 Blackbirds, Water-rail,
Black Redstart, Meadow Pipit.

CONINGBEG.—Water-rail.

HOOK TOWER.—Water-rail, Dunlin.

OLD HEAD, KINSALE.—3 Wheatears, 6 Robins, 2 Skylarks,
1 Black Redstart, 1 Stonechat, 1 Meadow Pipit.

BIRDS REPORTED AT LIGHTHOUSES, BUT NOT FORWARDED.

BALBRIGGAN.—Starling.

ROCKABILL.—Starling, Manx Shearwater, Blackbird, Thrush,
Curlew.

SOUTH ARKLOW.—Blackbird, Starling, Thrush, Chaffinch,
Goldfinch.

BLACKWATER BANK.—Curlew, Robin, Linnet.

LUCIFER SHOALS.—Starling, Blackbird, Thrush, Skylark.

TUSKAR.—Starling, Thrush.

CONINGBEG.—Starling, Blackbird, Thrush.

HOOK TOWER.—Starling, Blackbird, Thrush, Manx Shearwater.

OLD HEAD, KINSALE.—Starling, Manx Shearwater.

BIRDS SAID TO HAVE BEEN SEEN INLAND.

WATERFORD.—Starling, Thrush, Blackbird, Oyster-catcher.

NEW ROSS.—Starlings.

CARLOW.—Starling, Curlew, Wild Duck, Blackbird, Thrush,
Wood-pigeon, Redwing, Brambling, Sea-gulls.

CARRICK-ON-SUIR.—Starlings, Cormorants, Herons, Curlew,
Thrush, Blackbird, Snipe, Redwing, Gulls, Water-
rail, Skylarks, Titlarks, Owl, Duck.

DUNGARVAN.—Starling.

LISMORE.—Starling and Curlew.

CLOXMEL.—Starling.

The identification of birds at night is unreliable, and the value of records, unaccompanied by specimens, must be judged accordingly. The Water-rail always attracts the attention of light-keepers, and is forwarded in relatively large numbers at all seasons.

Fassaroe, Bray.

THE CLARE ISLAND SURVEY.

THE first fruits of the scientific work which has been going on during the seasons of 1909 and 1910, and which is still in progress, in Clare Island and the surrounding district of Co. Mayo, have now appeared in the form of three papers published by the Royal Irish Academy, dealing respectively with Gaelic Plant and Animal Names, Agriculture and its History, and Marine Mollusca. The author of the first and last of these is Mr. Nathaniel Colgan, and of the second, Professor James Wilson. Several others of the series have already been presented to the Academy, and are now at press; namely, Hydracarina (Water-mites), by J. N. Halbert; Pseudoscorpiones (False Scorpions), by H. Wallis Kew; Arctiscoida (Tardigrada or Water-bears), by James Murray; and Rotatoria Bdelloida (Bdelloid Rotifers) by the same author. On the cover of the published reports the general scheme of publication of the series is given, from

which an idea may be gained of the extent of the work, and the thoroughness with which it is being carried out. The whole (which will form vol. xxxi. of the *Proceedings* of the Academy) will consist of a series of sixty-seven reports, dealing with almost every section of the fauna and flora of the area, and much in addition. Thus, following on a general description of the area and narrative of the investigations (by R. Ll. Praeger) will come an account of the history and archaeology of the island (by T. J. Westropp), and of the place-names (by the same and J. H. Lloyd). There will follow meteorology (W. J. Lyons), geology (Professor Cole), peat deposits (F. J. Lewis), and tree growth (A. C. Forbes). It will be seen that the services in each subject of the men best qualified in Ireland for the respective tasks have been secured, and that where no specialist was available in Ireland help has been called in from across the Channel, as in the case of Mr. Lewis, whose researches on the Scottish peats are widely known. The same principle runs through the whole series. Thus, while in botany we find the names of Canon Lett, D. M'Ardle and R. Ll. Praeger opposite the names of those groups in which they are well-known workers, we see that Sir H. C. Hawley and Carleton Rea have been called in to work out the Fungi, Miss Lorrain Smith of the British Museum the Lichens, A. D. Cotton of Kew Herbarium the Marine Algae, and William West the Diatoms, &c.

The zoology of the series presents a formidable aspect, embracing no less than fifty reports on as many groups. Many of these are groups which have either been hitherto almost or totally unworked in Ireland, or on which very little recent work has been done; such, for instance, are the Diptera, Pseudoscorpiones, Arctiscoida, Rotifera, several groups of worms, Porifera, Infusoria, Flagellata, Mycetozoa, Rhizopoda, and Heliozoa; the working out of these groups is sure to add very largely to our knowledge of them in Ireland. In the preparation of these fifty faunistic reports almost all our Irish zoologists are taking part. We notice the names of Balfour Browne, Barrett-Hamilton, Carpenter, Colgan, Farran, Foster, Halbert, W. F. Johnson, Kane, Nichols, Pack-Beresford, Patten, Rankin, Sherrard, Scharff,

Southern, Stelfox, Miss Stephens, Ussher ; while among the volunteers from across the water are J. S. Dunkerly (Infusoria and Flagellata), P. E. Grimshaw (Diptera), E. Heron-Allen and A. Earland (Foraminifera), H. Wallis Kew (Pseudoscorpiones), Claude Morley (Hymenoptera), James Murray (Arctiscoida and Rotatoria Bdelloida), Eugène Penard and G. H. Wailes (Rhizopoda), Carleton Rea (Mycetozoa), C. F. Rousselet (Rotifera), D. J. Scourfield (Fresh-water Entomostraca), and W. M. Tattersall (Crustacea). From the "Reports of Progress" of the Clare Island work for 1909 and 1910 which have already appeared in our pages, it is evident moreover that these lists of authors do not by any means represent all the workers who have been engaged in the district since the survey commenced.

Turning to the reports already published, or presented to the Academy and now in the printer's hands, they give evidence of the very great advance in many directions which the publication of the series will bring about, as regards our knowledge of the fauna and flora of Ireland, and kindred subjects. In Halbert's paper on the water-mites, for instance, eighty species are recorded. Of these five are new to science, a dozen more are new to the British Isles, and another dozen are now for the first time recorded from Ireland. The new and rare species will be illustrated in three large folding plates. Murray's report on the Arctiscoida opens with the pregnant remark : "Irish water-bears appear to have no history. I can learn of no records previous to the commencement of the work of the Clare Island Survey." Thirty-three species are now recorded, five of which are new to science, and half a dozen more previously unrecorded from the British area. From the same writer's report on the Bdelloid Rotifers, we find that up to the present the Irish list has stood at eighteen species ; it now stands at sixty. Colgan's list of Marine Mollusca numbers 243 species, and represents a great advance in our knowledge of the shells of the West of Ireland ; two additions to the Irish fauna are included. The same writer's "Gaelic Plant and Animal Names" supplies a chapter on a very interesting subject. Much which has

been written on this matter has its scientific value sadly diminished by the fact that the writers were not naturalists, and their determinations of the plants and animals to which the names which they record are applied, are consequently not reliable. Mr. Colgan's reputation as a naturalist is a welcome guarantee of accuracy of identification. In his paper on agriculture, Professor Wilson leads us far afield, tracing up the history of Irish agriculture from its Roman and Germanic sources, and ending with an account of the present agricultural conditions of Clare Island. The reports are handsomely printed and are sold at a rate which makes them accessible to every one, and the Royal Irish Academy is to be congratulated on its successful fathering of a scheme which will give us the most complete organized scientific survey of a definite area which has, so far as we are aware, ever been attempted.

IRISH SOCIETIES.

DUBLIN MICROSCOPICAL CLUB.

APRIL 12.—The Club met at Leinster House, A. R. NICHOLS, M.A. (President), in the Chair.

R. SOUTHERN exhibited a free-living marine Nematode belonging to the genus *Sphaerolaimus*. The complicated structure of the buccal cavity was shown, and compared with the simpler structure in other forms.

Dr. G. H. PETHYBRIDGE exhibited young foliage of a pear-tree attacked by the Pear-leaf blister-mite (*Eriophyes pyri*) which had been obtained from Greystones, Co. Wicklow. The leaves were very strongly rolled inward along their midribs, and were covered with small blisters which, where they were exposed to light, were strongly tinged with a red colour (anthocyanin) but where shaded owing to in-rolling, were green. In but few cases was it possible to find a perforation or hole in these blisters, and it was found impossible, at this stage, to discover any mite in the blisters by means of preparation needles and the dissecting microscope alone, although prolonged attempts were made to do so. In serial sections made through a single blister, however, it was found possible to discover the mite and a section showing the tail end of the mite in the cavity of the blister was exhibited. It is clear therefore that at this early stage of the attack the number of mites in each blister must be very small and possibly may not be more than one.

F. W. MOORE showed leaves of a camellia plant attacked by the

Fungus, *Pestalozzia Guepini*. This is the parasite known as the "Grey Blight" of the tea-plant, a pest which has done considerable damage to tea-plantations in Assam. On germinating, the conidia rapidly grow and enter the tissues of the leaf where large quantities of mycelium develop, breaking up the cell walls, and choking the vessels, until considerable patches of dead tissue are formed. These patches are grey in colour. This fungus has been found on leaves of camellia, rhododendron, and other exotic genera in Europe.

J. N. HALBERT exhibited two nymphal forms of a freshwater mite *Protzia eximia* from streams on Kilmashogue Mountain, County Dublin. In one of these the provisional genital area is of the usual four-disked type common amongst immature forms of the family Limnocharidae. The second nymph has ten discs, resembling in this respect the nymphs of *Thyas curvifrons*, a species recently described by Dr. Walter from Switzerland. The genus *Protzia* is a stenothermal form occurring only in rapid streams in highland districts.

CORK NATURALISTS' FIELD CLUB.

NOVEMBER 26.—Professor I. SWAIN conducted an excursion to Carrigrohane (the first winter excursion ever undertaken by the Cork Club) for the purpose of studying the "river-terraces" of the Lee. Alighting at the station, the party went to the bridge, from which point a good view of the two lower terraces could be obtained. Here a general summary of the geology of the Old Red Sandstone and Carboniferous formations were given, and an explanation of the crumpling that succeeded Carboniferous times, and the denudation that removed the limestone from the hills, together with the differential weathering that left sandstone exposures as hills, and carved out valleys in the limestone areas. The reason why the river flowed over the Carboniferous shales instead of over the limestone was also given. Terrace-formation was next dealt with; beginning with the most recent, edging forward into the concave side of the stream just below, where the water was more quiet, it was seen that new terraces were formed as the river deepened its bed, so that the higher terraces are the older ones. Walking back to Cork, terraces Nos. 3 and 4 were seen from the lane leading up to Carrigrohane Bridge, and nearer to Cork a fine Boulder-clay deposit was investigated, and striated stones were obtained.

JANUARY 30.—The Presidential Address—"The Geology of the South of Ireland," was delivered by Professor I. SWAIN at University College. Dr. A. W. Sandford presided, and there was a large attendance of members and their friends. The lecture was illustrated by a fine series of lantern slides.

MARCH 29.—F. R. ROHU delivered a lecture on "Our Native and Migratory Birds," which was illustrated by a number of stuffed specimens, at the School of Art. Professor Hartog presided. A short discussion followed the lecture.

NOTES.

ZOOLOGY.

Hibernation of Leisler's Bat.

A Hairy-armed Bat (*Nyctalus Leisleri*) which was caught in a greenhouse in Co. Wexford on the morning of April 27th, was forwarded to me alive by post, and reached me on the morning of the 28th in that state of hibernatory slumber which bats so often assume during a railway journey. This bat, however, instead of waking up towards evening, continued to hibernate during the whole of the 28th, 29th, and 30th of April, and it was not until a few minutes after sunset on the evening of the 1st of May that, hearing a little stir in its box, I looked in, and found the animal returning to active life. As soon as it was sufficiently wakened, I gave it its liberty, and let it fly off to catch insects for itself. The thermometer during the three days when the bat did *not* wake had reached temperatures of 56·5° Fahr., on the 28th, 57·3° on the 29th, and 57·4° on the 30th of April, while the temperatures at 9 p.m. ("Daily Express" records) were respectively 43·4°, 47·5°, and 49·7°. On May 1st, when the hibernation ended, the maximum was 58·2°, and the temperature at 9 p.m. 52·7° Fahr. In a paper on this bat (*I.N.*, vol. ix., p. 240), I stated that I had never seen it flying *numerously* when the day's maximum had been below 56°; but the conduct of the animal recently under notice shows that some individuals will continue to hibernate through a temperature some two degrees higher.

C. B. MOFFAT.

Dublin.

The Nuthatch in Ireland.

The Nuthatch recorded by Mr. W. J. Williams (p. 95) as having been observed by himself and others at Malahide is not absolutely the *first* bird of its species observed in a wild state in this country, for I remember Mr. H. Lyster Jameson assuring me so long ago as 1894, that he had seen a Nuthatch in a demesne in Co. Sligo, where it appeared to be thoroughly at home. Mr. Jameson, however, realised that naturalists must experience grave difficulties in believing that a bird of such habits had come unassisted into Ireland; and it was, I suppose, for that reason that he did not record the occurrence. I think the same doubts must be experienced with regard to the Nuthatch seen at Malahide. Scarcely another bird on the British list can compare with this species in the sedentariness of its habits. Even the narrow water of the Solent seems to be an effective barrier against its passage to the Isle of Wight, though it is common enough in parts of the Hampshire mainland. A still more remarkable fact about it is the total absence of any record of its ever having visited Heligoland during the long period covered by Herr Gätke's exhaustive chronicle. I think the only other British land-birds—apart from the very stationary Grouse—of which this can be said are the Dartford Warbler and the Lesser Spotted Woodpecker, and the fact of the last-named falling into such a category seems to me a strong proof of

Mr. Ussher's wisdom in not admitting it into his "List of Irish Birds," despite certain statements as to its having been several times obtained in this country. Of course, no one will doubt the correctness of the identification made by Mr. Williams, and I am very glad that he did not wish to have the bird shot. But I think the probability of it having received assisted passage into Ireland should not be overlooked.

C. B. MOFFAT.

Dublin.

Dace in Ireland.

Last autumn Mr. J. E. Godfrey sent me for identification two fish, taken from a shoal observed in the Blackwater between the fishing weir and bridge at Lismore. The external characters and the pharyngeal teeth show them to be Dace (*Leuciscus vulgaris*, Fleming), a fish which, so far as I am aware, has not previously been noticed in Ireland, though it is generally distributed in suitable waters in England and Wales.

The Lismore shoal was locally regarded as the descendants of the contents of a bait can emptied into the river by a keeper some years previously. Why any one should try to bring Dace as live bait from England or Wales I do not know, but, as they are very intolerant of this method of conveyance, it seems unlikely that the attempt would be successful. Moreover, Mr. F. H. Keane, of Ardmore, writes me that between 1873 and 1880 he used to catch below Lismore Bridge fish which his grandfather, the late Archdeacon Cotton, told him were Dace. Mr. Cotton had been a Thames fisherman in his young days, and no doubt knew Dace quite well; while Mr. Keane's account of their habits accords with my own experience of them in the Thames and elsewhere. It seems reasonable to suppose that Dace are truly indigenous in the Blackwater. Their recent abundance may be due to vigorous measures taken against the Pike in that river. The specimens, which are not in the best condition, have been handed over to the National Museum.

Dublin.

E. W. L. HOLT.

BOTANY.

Recent Notices of Irish Plants.

In the *Journal of Botany* for November, H. Stuart Thompson discusses H. N. Williams' record (in his *Prodromus Florae Britannicae*, part 7, 1910) of *Armeria alpina* from Kerry, and in the same number supplements his previous notes on South Kerry Plants. In the February number of the same journal, Wm. West writes on the flora of a wall-top at Waterville, Co. Kerry. In the April number A. D. Cotton discusses the Britaninic species of *Lithophyllum*, and gives Irish records; and the editor contributes brief notices, with portraits, of H. C. Hart, S. A. Stewart, and E. P. Wright, taken from the notices and portraits published in the *Irish Naturalist*. The *Journal* of the Royal Horticultural Society for November contains an article by R. Ll. Praeger on "The Wild-flowers of the West of Ireland, and their History," with four plates, being the substance of a lecture delivered in the preceding April.

THE BRITISH UTRICULARIAE.

BY G. CLARIDGE DRUCE, M.A., F.L.S.

(Hon. Sec. Botanical Exchange Club of the British Isles).

IN a recent number of the *Irish Naturalist* I drew attention to my discovery of two species of *Utricularia* new to Ireland. It may be well to give some description of these and their allies, since doubtless if attention is paid to this group a further extension of the range is sure to be made. The following account is taken from the pages of the *Report* of the Botanical Exchange Club of the British Isles for 1910. Might I say that the Club would be glad to welcome Irish field botanists as members, and I should be glad to send particulars?

UTRICULARIA.

This genus has been recently closely studied by Dr. Hugo Glück, who in his most interesting account of *U. ochroleuca* which appeared in the *Berichte Deutsch. Botan. Gesellschaft*, 149-156, for 1902, gave some additional characters by which that species may be distinguished from those previously known, and which enable the plant to be recognised in the barren state. Another very important contribution is that of Fr. Meister ("Mémoires de l'Herbier Boissier," n. 12, 1900). From these, and from verbal statements made to me by Dr. Glück, the following brief description of the British forms has been drawn up, in the hope that it may induce members to study more closely this interesting genus:—

CLAVIS.

- A. Submerged floating plants with all shoots of similar form. Leaves provided with numerous bladders and divided into numerous hair-shaped terminal segments, the leaf-tips toothed on margin.
=1. *U. vulgaris*. 2. *U. major*.
- B. Shoots differentiated into two forms: (1) green assimilating shoots which float in water, and (2) colourless shoots which are usually subterranean. Leaves divided into 7-20 segments.

Leaf-tips distinctly flattened. Leaves furnished with 0-8 bladders. = 3. *U. intermedia*. 4. *U. ochroleuca*. 5. *U. minor*. 6. *U. Bremii*.

B.

Bladders found chiefly on subterranean shoots. The green leaves bear solitary bladders or none. Leaves with 7-15 segments. Subterranean leaves with 0-3 bladders. Leaf-tips toothed on margin. Winter bud wrapped in a thick whitish tomentum. Bud-leaves palmately divided. Segments indented on margin and armed with hair-bristles standing together in tufts. = 3. *U. intermedia*. 4. *U. ochroleuca*.

BB.

Floating green assimilating, and colourless subterranean shoots about equally provided with bladders. Leaves ending in 14-20 segments and furnished with 0-8 bladders. Leaf-tip smooth on margin. Winter buds not covered with a hairy mantle. Bud-leaves palmate, with some dichotomous end-segments. The margin of the bud-leaves is neither indented nor provided with tufts of hair. = 5. *U. minor*. 6. *U. Bremii*.

AA.

1. *U. VULGARIS* L.

Pedicels two to three times as long as calyx (7-12 mm.), recurved and reflexed after flowering.

Corolla upper lip about as long as the projecting bilobed palate.

Lower lip much larger than upper with reflexed margins which scarcely project beyond the palate which is marked with a few separate pale red lines.

Anthers connate.

Spur adpressed to lower lip.

Leafy branches often very long, somewhat coarse.

Winter buds large (10 mm.), nearly globular or globular ovoid.

2. *U. MAJOR*, Keller.

Pedicels four to six times as long as calyx (12-30 mm.) straight and ascending after flowering.

Corolla upper lip twice or thrice as long as the projecting bilobed palate.

Lower lip with a broad flat spreading margin which projects greatly beyond the palate, is not reflexed, and is marked with chocolate brown lines.

Anthers free.

Spur conical, sub-compressed, not adpressed to lower lip.

Leafy branches usually slender.

Winter buds.

B.

3. *U. INTERMEDIA*, Hayne.

Green assimilating leaves quite without bladders.

Leaf tip obtuse with a prickle set on the apical margin.

Corolla bright yellow, or yellowish white, striped with purple.

Spur subulate, yellow as corolla, as long as lower lip to which it is adpressed.

Pedicels erect.

Winter bud after germination retains its original ball-shaped or weakly elliptical form. The section is egg-shaped, obtuse.

Prickles. The tufts are either situated on an extremely reduced leaf-flap or directly on its margin.

4. *U. OCHROLEUCA*, Hartm.

Green assimilating leaves always bearing sporadic bladders.

Leaf tip gradually attenuated into a long point which ends with a fine bristle.

Corolla sulphur yellow with brown striae. Upper lip flat emarginate.

Spur conical gradually diminishing from a broad base to the blunt apex, half as long as and standing apart from the lower lip. Red-brown.

Pedicels patent.

Winter bud in germination extends to more than twice its original length. The leaves of the winter bud are pointed at the tip, and the indentation of the leaf margin is stronger than in *intermedia*.

Prickles. The tufts of prickles at edge of bud-leaves are less numerous and not so strong as in *intermedia* and are situated upon a distinct leaf-flap.

BB.

5. *U. MINOR*, L.

Corolla pale yellow.

Upper lip as long as the depressed and inconspicuous palate.

Lower lip 6 mm. broad with recurved margin.

Spur very minute, scarcely longer than broad.

6. *U. BREMII*, Heer.

Corolla yellow, and more conspicuous than *U. minor*.

Upper lip emarginate. Upper lip 5 mm. broad and long.

Lower lip flat, not recurved at margin, 9-10 mm. broad.

Spur small ovate-conical.

I. *UTRICULARIA VULGARIS*, L., is reported from 86 British counties from Cornwall to Shetland, but as Watson points out, his enumeration includes *neglecta*. Therefore to be correct many counties require to be confirmed for the restricted plant, which I have seen in 6, 14, 22, 23, 24, 25, 26, 27, 28, 31, 32.

Probably some of the Scottish records may refer only to *major*.

2. *U. MAJOR*, Keller (*U. neglecta*, Lehm.), is reported in my "List" for 29 "counties." It is now on good authority reported from 1, 2, 6, 11, 12! 13, 15, 17! 19, 21, 22! 23! 24! 26, 41, 52, 58, 72, 73, 75, 79! 80, 88! 89! 90! 95! 96! 97, 98, 104, 105! 110, and with some doubt from 21, 99, 100, and 106.

I cannot accept the suggestion made in the "Prodrromus" that *major* is only a variety of *vulgaris*. It appears to me a quite distinct species, and I can scarcely imagine anyone seeing it growing with *U. vulgaris* when both are in flower venturing to place them in one species, except on a hyper-Benthamian standard, which is not now followed.

3. *U. INTERMEDIA*, Hayne. The recent separation of *U. ochroleuca* throws a doubt over many of the records in "Top. Bot.," and these should all be carefully checked. It is recorded for 27 counties from Dorset to Shetland. Many of the Scottish localities it may be presumed will yield for the species *ochroleuca*.

U. intermedia, vera, I have seen in 9, 11, New Forest. 89! Blair Athol 96! 100! 105! If growing in very shallow water *intermedia* has the two kinds of shoots of about the same length; these if dried carelessly become much intermingled, and it is not always in herbarium specimens easy to disentangle them, so as to be certain if the green shoot really bears bladders.¹

4. *U. OCHROLEUCA*, Hartm. This plant, to which Prof. Trail thought some of the Scottish *intermedia* might be referred, is treated as being certainly Scottish by Dr. Williams ("Prod. Fl. Brit." 348), and he gives Wigton, Kirkcudbright, Dumfries, Argyll, Sutherland and Skye; he also unhesitatingly adopts Neuman's ("Bot. Notiser," 65—66, 1900) view that it is a hybrid of *intermedia* and *minor*, since "these two plants are always found in its vicinity."

Dr. Glück, who was at my house last autumn, has made a very special study of this group, and has been able to

¹ The Bucks record in footnote ("Top. Bot." p. 333) for *U. intermedia* refers to a record for Burnham Beeches, a locality which only yields *U. major*.

correct some of the statements made by Meister, and to give additional characters by which this species (as he holds it) is to be distinguished.

U. ochroleuca, first discovered by Hartman in Sweden, has been since found in Norway and France (Vosges) (to this perhaps is to be referred Celakovsky's *U. intermedia*, var. *brevicornis* from West Galicia), also in South Bohemia, Brandenburg, the Rhine Palatinate and some other places in North Germany. To these localities Glück fortunately added that of the Black Forest, where it occurs in the absence of *intermedia*, thus practically proving that it is not a hybrid. My query in the "List" was as to its occurrence in Scotland, since the records made were suggestive rather than positive.

Dr. Glück recognised as *ochroleuca* a specimen in my herbarium which I gathered in Loch Mallachie in Easternness in 1882. I have also one collected near Aviemore in 1869 on my first visit to Scotland. The gradual attenuation of the leaf segments, and the presence of a few bladders on the assimilating shoots, offer ready means of identifying the plant in its usually barren state, as Dr. Glück (*Deutsch. Bot. Gesell.*, xx, 141, 1902) shows. This leaf character gives the plant a slightly more graceful habit. In dried specimens it is essential to observe if the assimilating shoot is not stuck down with an adhering subterranean shoot, or if the utricles have not been separated from the proper shoot and accidentally fastened to the green shoot. I have seen *ochroleuca* from 88 Coninish Valley, 1888; 89 Loch of Lowes (Hb. Hanbury); 96 Loch Mallachie, Aviemore; 107 and 112 (Beeby, 1890, Hb. Br. Mus.). Dr. Glück also named as *ochroleuca* my specimen collected in 1875, from Kylemore, Galway. Trail refers to specimens from 72, 74, 98, 104, and 108.

Another argument against *ochroleuca* being a hybrid is the rarity of the flowering stage in the two supposed parents, and although the book-characters are remarkably intermediate, and as some botanists would say, "just what I should suspect a hybrid of the two species would be," yet really hybrids are not often such a complete half-way

house, while I am told that the flowers of *ochroleuca* have quite a different appearance from those of *intermedia*¹; nor although *U. vulgaris* and *U. major* grow together and flower freely, has any hybrid yet been observed between these two allied species, nor indeed has Focke described one in the genus.

I may add that although *ochroleuca* appears to be the boreal or alpine species, yet it prefers open pools in sunny places, and in Baden grows in somewhat deep water (1 metre), and that Glück places much stress on the foliage characters as a means for specific distinction.

5. *U. MINOR*, L.; has a census number of 71 (2), which is probably too high, since *U. Bremii* and small barren states of *U. major* have been confused with it. The latter may be easily detected since *minor* has no bristly hairs on the leaf-segments. Barren states of *Bremii* however with our present knowledge cannot be safely separated. *U. minor* is reported from West Cornwall to the Orkneys, and in Scotland ascends to 2,250 feet (*A.N.H.S.* 122, 1907), and it also occurs in Guernsey.

6. *U. BREMII*, Heer. This has long been suspected as British; indeed Mr. F. M. Webb (*Journ. Bot.* 142, 1876) recorded it on faith of a specimen (in Herb. Kew.) gathered by Jas. B. Brechan in the Moss of Inshoch, Nairn. Mr. Webb also suggests that the flowerless examples from the Isle of Wight (Dr. Bromfield), Titchfield Common, Hants (also Bromfield in Hb. Kew) (see "Fl. Hants," 329) should be looked to. Mr. F. N. Williams ("Prod." 349) unhesitatingly refers all these with the plant from Gordon Bog, Berwick, and from the Loch of Spynie, Elgin (Hb. Winch) to *Bremii*, although he says of the Inshoch plant "the flowers are not recognisable," while the others are all, I believe, barren. But Dr. Glück tells me one cannot on our present knowledge trust to the leaf-characters to distinguish the two species, although the differences may be suggestive. Fortunately, however, he was able to find

¹ Professor Trail (*A.N.H.S.*) has likewise drawn attention to the probable occurrence in Scotland of *ochroleuca*, and a paper on the British Utriculariae, by the Rev. E. F. Linton, appeared in *Trans. Bot. Soc. Edinb.*

undoubted *U. Bremii* in my herbarium, the specimens in good flower being gathered by me near the Gap of Dunloe, Co. Kerry, in 1875. I may add that although I have examined Loch Spynie, the Moss of Inshoch and Gordon Bog (where I found *U. minor*), I was unable to find *Bremii*; near the Loch of Spynie, young barren *major* was seen. If our members will carefully collect the Bladderworts for a season or so there is good reason to believe that some of the old records may prove to be correct. Flowering specimens should if possible be put in spirit, notes on the flower in the fresh state being first made. *U. Bremii* 10? ? Betn. Horrington and Newchurch;* 11? Titchfield Common; 81? Gordon Bog; 85? Loch of Spynie and Moss of Inshoch. All lowland stations.

Dr. Glück says the characters which separate *Bremii* from *minor* are specific, this species bearing much the same relation to *U. minor* as *U. major* does to *U. vulgaris*. The larger flowers of a darker yellow, with a much larger lip which stares at one, are easy marks of distinction, but in the barren state a greater or less amount of development of leaf-segments and a more sparing development of bladders are not sufficient for separation, although such an appearance may be suggestive.

As to the leaf-characters of the Utriculariæ one may add that our British plants may be divided into three groups by the number of the leaf-tips: (1) very numerous—*vulgaris* and *major*; (2) 7-15—*intermedia* and *ochroleuca*; (3) 14-20—*minor* and *Bremii*.

Oxford.

NEWS GLEANINGS.

The Belfast Municipal Museum.

The Corporation of Belfast, at the monthly meeting on June 1st, confirmed the agreement made between the Parks Committee and the Technical Instruction Committee to let to the latter, at a rent of £150 per annum, half an acre in the Botanic Gardens Park, for a Natural History and Art Museum and an Art Gallery. So the long and weary hunt of the Museum Site Sub-Committee for a suitable place has come to an end at last.

"LUMINOUS OWLS."

BY MILDRED ELINOR DOBBS.

WITH NOTES BY C. B. MOFFAT, B.A.

HAVING been asked by Mr. Ussher to write down anything I may have observed about "Luminous Owls," I must first state that I do not know, from my own observation, that what I have seen are owls; I only conclude they are, from having read the correspondence on the subject in the *Times* (December, 1907).

My attention was drawn to them by the ferryman at Villierstown ferry mentioning seeing birds at night-time giving a light. As he was formerly a gamekeeper, I conclude he was not mistaken in thinking what he saw were birds.

The first time I saw them myself was one winter evening at dusk; the ferryman, just as I was stepping into the boat, pointed down the river, saying, "There are two of the birds now," and I saw a couple of lights moving along the hillside towards Headborough between it and Strancally, a point a mile in a straight line from where I stood. They moved irregularly, sometimes disappearing, sometimes nearly stationary, then moving rapidly. Even though the ferryman evidently was in earnest when he said they were birds, I should have doubted their being anything but the light from a trap or bicycle being driven along the Strancally drive and disappearing and appearing between the trees; but one light suddenly turned and went rapidly back, past Strancally, crossed the river (which is quite 200 yards at that point), keeping about sixty feet above it, and in a few seconds began going along the opposite hillside and then after a minute disappeared. The other light kept on flickering about the Headborough trees and presently disappeared in the direction of Tallow.

I have often seen them since, but they are difficult to observe, as usually one sees them appear for a few minutes moving rapidly, and then it may be another half-hour before one catches sight of them again. My impression is that it is only when they are flying partly or entirely towards one, that one can see the light, it disappears so suddenly and will appear again many yards to the right or left.

The Blackwater River here is from 200 to 400 yards wide, and about a mile below the ferry it is joined by the Bride, also a tidal river, and about fifty yards wide; between the two rivers is a stretch of low-lying fields with no habitation on them, the whole forming a triangle with sides a mile long each. The river is kept out by a high embankment on which one can walk, but between the bank and the fields there is a deep broad ditch by no means easy to cross without a plank; in fact, the only way to get on or off the embankment is at each end, where it abuts on the road from the ferry to the Bride bridge, which forms the third side of the triangle.

I and my two sisters were on the ferry slip one evening at the end of last December, about 2½ hours after sunset; the night was dark but we could see the course of the river and shape of the hills about. We lingered a moment to see if any birds were visible.

We saw a light flash up on the left across the river, half-way up the hillside; it was reflected brightly in the river, the night being perfectly calm. It disappeared at once and I remarked that "it must have been a cottage door opened." Then a moment later it came again in the same place but went up with a swoop to nearly the top of the hill, a rise of some 100 feet in a few seconds, and then moved rapidly to the right, got dimmer and disappeared; it appeared again beating backwards and forwards along the hillside with long swoops, but was not so brilliant. At the same time a light appeared down the river and it looked as though someone were carrying a lantern and walking along the top of the embankment towards us and about a half mile away.

It was difficult to see if this was moving much or not, but it seemed to be coming nearer and to go out over the river once or twice, and then disappeared. A few minutes later we saw it again much nearer, a quarter of a mile off, and it gave the impression of moving rapidly towards us and about three feet from the ground; it came to within 100 yards and then the bird turned and the light vanished for a moment, and we saw it again out over the fields to the right, 200 yards away and pretty high up.

The light it gave was a reddish yellow, and one could see a vibration about it as though the beat of the bird's wings came across the light and made it look flickering. In fact it was so exactly like the light given by an oil bicycle lamp when someone is riding on a rough road that it was difficult to believe it was nothing of the sort : it was a shade redder in colour but quite as strong as the usual oil bicycle lamp. From the time we saw it first away down the river till it turned and went out over the fields was about twenty minutes.

I know now that I must have often seen these birds before, as crossing the ferry on winter nights I have wondered why anyone should be wandering with a lantern along the embankment and in the fields so late when there are no animals to look after. Now when I see a light I stop to observe it, and if I suddenly see it swoop out over the river or travel in half a minute from the bottom to the top of a hill 400 feet high (and sometimes even high in the air above it, as I have seen on occasions), I know it is a bird and not a man with a lantern. The most remarkable fact which strikes me each time I see one, is, the quality of the light. I expected to see a white phosphorescent light, not the reddish yellow it is ; when the bird swoops up it seems to flash out brighter and not so red, but this may be a delusion, the bird moves so quick.

I have several times seen it reflected in the river when the bird has been over the hillside three-quarters of a mile from where I was standing. Four lights at a time is the largest number I ever saw, two is the usual number.

I have seen them more often on rather damp nights with heavy clouds overhead. I have seen them also on clear nights when the moon is half full and giving a good deal of light. The ferryman, on my asking him when he noticed them first, said he did not remember, they had always been there even when he was a boy (he is about 43), but he did not see much of them till he became ferryman about eight years ago.

I have read over this account to one of my sisters who is at home, and she fully subscribes to the account of what I saw with her.

Camphire, Carpoquin.

NOTES BY C. B. MOFFAT, B.A.

Miss Dobbs's article forms a welcome contribution to the study of a question that is still in much need of further elucidation, and it is supplemented by a letter from another observer in the same locality, the Rev. W. H. Rennison, who, when crossing by the ferry already referred to, has repeatedly observed the moving lights of which Miss Dobbs speaks, and who, like her, believes them to be due to luminous birds.

Mr. Rennison, writing on October 29th, 1910, to Mr. Ussher, states that he has "again seen the light," which he ascribes to "a bird of some sort," a few minutes before six o'clock on a recent evening. "When I saw the light," he proceeds, "it was low down near the quarry opposite the Bride's mouth, and took a direction towards the top of the hill, appearing to rise considerably from the ground and then to fall again, reminding one rather of the motion of swallows over water, suddenly dipping down, and rising again. It then turned eastward and appeared regularly to 'quarter' all the low-lying marshy land between the Gorish River and Dromore Hill." Mr. Rennison, like Miss Dobbs, remarks on the resemblance sometimes presented by the light to that of an ordinary lamp, but he fully agrees with her as to the impossibility of a human being "traversing the extent of ground with the motion or in the time." He states that he watched it on this occasion for half an hour, and that the ferryman, who pronounced it "our old friend the owl," informed him that he always saw it best "on moonless nights in damp weather." In a postscript Mr. Rennison adds that although on the particular evening in question only one light was seen, he has "frequently seen two, over Camphire and Bride Valley, which passed and repassed each other." This corroborates the remarkable statement of Miss Dobbs, that, while "four lights at a time" are the largest numbers she has seen, "two is the usual number."

Reference has been naturally made in the course of Miss Dobbs's article to the correspondence which appeared in the

Times in December, 1907, on the subject of a supposed luminous owl that was seen for a number of evenings during that month in North Norfolk.

Sir Digby Pigott, who inaugurated that correspondence, had, unfortunately, not himself seen the object in which he succeeded in exciting so great an interest. It had been described to him by various informants, who had seen a light like that of a motor cycle moving sometimes low over the country, sometimes rising to a height in the air, and crossing fields, high fences, and a stream. The evenings on which this light was observed appear to have been generally misty. In the course of the correspondence that the story excited, a West Norfolk gamekeeper declared that he had once shot one of these moving lights, and found it to be "a poor old half-starved Barn Owl." Another correspondent, writing from Shropshire, had known a pair of Barn Owls of which either one or both (he could not certainly say which) had the gift of luminosity. He believed, however that they only shone when in poor condition, and he never saw more than one of them luminous at once. There is thus on record more than one *direct* observation (though the names of the observers are not stated) as to the occasional presentation of a luminous appearance by the Barn Owl.

In reference to these few cases of direct testimony (*i.e.* the Norfolk gamekeeper and the unnamed Shropshire correspondent) it may not be immaterial to mention that a belief in the luminosity of owls evidently prevails among country folk in parts of England; since beliefs of this kind, while they may or may not have a foundation in fact, undoubtedly sometimes operate on the imaginations of those familiar with them. The Shropshire correspondent of the *Times*, for instance, narrates that he had, before he made the acquaintance of his pair of luminous owls, been told by school children in the district that a light he had seen moving about was a "glim ullert" (*i.e.*, shining owl); and "glimmer gowk" is included in Hett's "Dictionary of Bird Names" amongst the popular designations of the Barn Owl. It is even possible (as Sir Digby Pigott himself suggests) that the same belief may have found expression in the Linnean name of that species, *Strix flammea*. It

seems, therefore, safer for the present not to accept as absolutely conclusive the statement that owls, even when in poor condition, have been seen flying about with phosphorescent breasts.

A belief has long prevailed ascribing similar luminosity to several of the herons and bitterns, which are supposed to be assisted in their nocturnal fishing operations by a phosphorescent light emitted from the "powder-down patches" of the breast-feathers, a light that is thought to serve, perhaps, the double purpose of attracting fish to the vicinity and helping the watchful bird to see them. A *résumé* of the chief evidence on this subject is given by Mr. Harting, in a very interesting chapter entitled "The Fascination of Light," in his "Recreations of a Naturalist." Mr. Harting there shows that at least one of the many sportsmen who claim to have seen these luminous herons, a Mr. W. J. Worrall, of Philadelphia, has given a detailed description of how he once shot one, a specimen of the Great Blue Heron (*Ardea herodias*) of the United States, which had "three phosphorescent spots, one in front, and one on each side of the hips between the hips and the tail;" and the description goes on to state that the wounded bird as it expired lost its lustre gradually, the light "disappearing entirely with death." The Great Blue Heron, except in its larger size, so strikingly resembles our own common species that it is scarcely conceivable that this remarkable property should belong to one and not be common to both. Naturalists, however, have not taken the verdict as proven, even for the American bird.

It will have been noticed that most of the testimony furnished by Miss Dobbs and by Mr. Rennison relates to observations in the late autumn and winter, and that this was also the time of year when the phenomenon attracted so much attention in Norfolk. In both cases, too, the locality frequented was near to a river or stream, and misty and moonless nights were considered by observers in both districts the most favourable for the appearance of the lights. The fact that Miss Dobbs generally sees two, and has seen so many as four of the lights at once, is a difficulty in the way of supposing so thinly distributed a bird as the

Barn Owl to be the cause, unless a newly-reared family lived in the immediate neighbourhood : and their being so frequently seen agrees little with the theory tendered by the Shropshire and Norfolk witnesses that the luminosity is an effect of ill health. Luminous insects, although it is probable that some occur in Ireland, are nearly placed out of court by the December date of so many of the observations ; and it also seems difficult to suggest that any other species of bird, even though it might have been carrying or have come in contact with decaying and phosphorescent substances, is more likely than an owl to have produced the appearance described.

It is worth inquiring whether the hypothesis of an *ignis fatuus* is out of the question. This phenomenon is so generally pictured as “dancing” and “flickering” about marshy land that one does not think of it as performing steady journeys over regular beats like those described in the communications before us. These descriptions, however, strongly recalled to the present writer an account given him by Mr. E. C. Barrington of the movements of a “Willy-the-Wisp” which apparently frequents the Donabate estuary with some regularity during suitable nights in late autumn. Mr. Barrington has, accordingly, been applied to for a short description of the phenomenon in question, and has written in reply as follows :—

“During the months of November and December, sometimes in January, while duck-shooting on the mud-flats round Donabate estuary, I have frequently observed Willy-the-Wisp. The light on many occasions was very bright, and would travel at a considerable speed over wet ground, going out and reappearing some little distance off. It would often retrace its steps, and more than once I have seen it patrolling the same beat for upwards of half-an-hour. All the nights I have visited this locality there was a slight moon or full moon with cloudy sky ; I admit it was when the moon retired I saw it most. On one or two occasions I saw it travel over very deep mud and against the wind, when it would come to a certain shape and flare up and go out, reappearing at intervals, like a flame, and then retire. Many natives round that district have seen

it and know of it. . . . Over some of the ground it travelled no person could walk, as it was very deep mud."

It may, perhaps, be suggested that the Donabate people, who are familiar with this autumnal appearance, mistake a bird for a phantom. In any case, a striking similarity seems to exist, both in the nature of the movement described and in the locality, season, and conditions favourable to its production, between the subject of Miss Dobbs's and Mr. Rennison's communications and that of Mr. E. C. Barrington's. One does not wish to hear of an owl, whether luminous or otherwise, being shot to decide whether it is a true "glim ullert" or not. But the locality might usefully be kept under observation throughout the year, and particularly in summer, with a view to ascertaining whether the beat that is so much frequented by the supposed phosphorescent owls in dark autumn and winter nights is equally favoured by the undoubted *Strix flammea* during its twilight peregrinations in the long evenings of June and July.

Dublin.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a young Abyssinian Lion from H.M. the King, three Hedgehogs from Mr. F. Godden, two Angora Rabbits from Mr. R. Hughes, two Peahens from Viscount Iveagh, a Black-faced Silky Fowl from Major B. R. Horsburgh, a wingless Fowl from Mr. C. W. Parsons, two Fantail Pigeons from Mr. N. Mather, fifteen Barbary Doves from Mr. N. J. Foley, a Canary from Mr. W. Fielding, two Quaker Parrakeets from Mr. H. A. Swaynes, a Green Muscovy Drake and two Common Sheldrake, a Cambayan Turtle-dove, and a Ring-necked Pheasant from Mr. F. Finascrey, three Long-eared Owls from Mr C. E. Exshaw, three River Lampreys from Mr. P. K. Dixon, and three freshwater Pearl-Mussels from Mr. B. E. Hillis. Mr. H. B. Rathborne has deposited an interesting collection of twenty-three exotic birds.

A young female Orang-utan, four Common Marmosets, and four Egyptian Gerbilles have been purchased. The Orang is now very lively and playful. On warm, sunny days she is taken out into the Gardens and makes herself at home among the boughs of the large beech trees, in which she has built several nests for herself.

DUBLIN MICROSCOPICAL CLUB.

MAY 10.—The Club met at Leinster House. A. R. NICHOLS, M.A. (President) in the Chair.

Dr. G. H. PETHYBRIDGE exhibited various stages of development of the Potato "Collar Fungus," *Hypochnus solani*, (Prill. et Del.) In its fruiting stage this fungus forms a white, felt-like covering of no great density or thickness around the bases of potato stalks (it has also been observed on the carrot) close to the soil and extending upwards for a distance of an inch or more. This "collar" consists of much branched mycelium which for the most part is colourless but is occasionally tinged with brown. It bears large numbers of basidiospores which easily fall off, but it does not penetrate into the tissues of the potato stalk, nor have any haustoria or sucker-like organs been observed. In the United States the fungus has (apparently unnecessarily) been given the name of *Corticium vagum* var. *solani*, and Rolfs showed in 1904 that it is the spore-bearing stage of a fungus which has been known for a much longer time under the name of *Rhizoctonia solani*. In the *Rhizoctonia* condition the mycelium is brown and is very frequently found on the surface of potato tubers, where it also forms dense aggregations or sclerotia, which are exceedingly common in some parts of Ireland. During last summer confirmatory evidence of the oneness of *Hypochnus* and *Rhizoctonia* was obtained at the Clifden Station for the Investigation of Plant Diseases, since it was found possible to trace an unbroken connection between the mycelium of the "collar" and the sclerotia on the surface of the tuber. Further confirmatory evidence of the same thing was published early in the present year by Riehm. The fungus, whether in its sterile sclerotial condition or in the fructification or "collar" stage should therefore be known in future as *Hypochnus solani* (Prill. et Del.) and the older name of *Rhizoctonia solani* (Kühn) must be dropped.

Prof. G. H. CARPENTER showed the anterior spiracles of the puparium of a small two-winged fly, *Scaptomyza flaveola* (Fallen) whose larva feeds on the surface, or mines in the tissues of the leaves of crucifers. The specimen exhibited had been reared from larvae feeding on the leaves of Swede Turnips from Dundalk. The anterior spiracle in the puparium of this insect is remarkable for the elongate branching arrangement of the external air-tubes, so that it presents somewhat the appearance of a stag's antler. Some details of the early stages will shortly be published with illustrations, in the *Journal of Economic Biology*, vol. vi.

BELFAST NATURALISTS' FIELD CLUB.

MARCH 15.—GEOLOGICAL SECTION.—W. J. C. Tomlinson in the Chair. WILLIAM GRAY delivered a lecture on "Limestone." A discussion followed, in which Robert Welch, A. R. Derryhouse, A. W. Stelfox, and the Chairman took part.

MAY 27.—EXCURSION TO TORR HEAD.—This was the inaugural excursion of the season, when twenty-four members and friends proceeded to Ballycastle by the eight o'clock train. Upon arrival brakes were immediately mounted for Torr. Many features of geological interest were passed during the drive, of which the great accumulation of glacial

drift through which the Carey River has cut its way was most commented upon. Leaving the brakes at a point some 700 feet above Ballycastle, the party proceeded on foot towards Torr, and in a few minutes the watershed was crossed, and a grand view of the coast once more obtained. Only a few of the party descended to Portaleen and Torr, but those who did so were amply rewarded. The geology of the Torr area is strikingly different from that of the rest of Antrim. Here the Chalk rests directly upon the pre-Cambrian schists, the oldest rocks in Ireland, which rise to a height of nearly a thousand feet. To the south the basaltic cap of Carnanmore still overlies the Chalk, but over the greater part of the area this rock has been completely worn away. Encircling the greater part of Torr Head itself is a band of primitive limestone some 20 feet thick, which at the extreme point is faulted down. Large blocks of gneiss were also found, but this rock, which so closely resembles some of the coarser schists, was not seen in situ. The prevalence of boulders of a red granite, possibly of Scotch origin, may also be worth mentioning. The botanical members had a busy day, and most of the recorded Torr plants were observed, as well as *Sysimbrium thalianum* and *Erophila vulgaris*—two plants not hitherto noted in this locality. Of the mollusks only *Arianta arbustorum* is worth mentioning. This species, which is common in several places about the village of Torr, was reported to be in great quantity among the alpine on the Chalk escarpment. Only two common species of woodlice were observed, but several millipedes and centipedes, a hitherto neglected group, were collected, the common *Stomius marginata*, *Iulus albipes*, and a species of *Lithobius* being taken. At 3.45 brakes were again mounted, and the party returned to Ballycastle, where, after tea at the Antrim Arms Hotel, a short business meeting was held.

MAY 6.—GEOLOGICAL SECTION.—EXCURSION TO MAGHERAMORNE.—The members of the section left Belfast by the 2.15 p.m. train and on arrival at Magheramorne proceeded to the quarry close to the railway station. Here are exposed magnificent sections of "White Limestone" with horizontal bands of flint, surmounted by basalt, capped with boulder clay. Two fine basic dykes were noted. About the centre of the quarry a fault brought up the "Chloritic Chalk," this was the only place it was visible, and no lower divisions of the Cretaceous strata were observed. Fossils were not abundant, but the record included *Belemnitella mucronata* Schloth; *Echinocorys vulgaris*, Breyn; *Rhynchonella octoplicata*, Sow.; *Rh. latissima*; *Terebratula carnea*, Sow.; a fragment of *Inoceramus*, and a fragment of an ammonite.

The walk was then continued to Glynn and on the way, the columnar basalt in Mr. Gregg's quarry was investigated. From Glynn, the party returned by the 6.15 p.m. train to Belfast.

CORK NATURALISTS' FIELD CLUB.

MAY 9.—ANNUAL GENERAL MEETING.—The President, Professor SWAIN, occupied the chair. The Hon. Secretary (J. NOONAN) read his report, from which the following are extracts:—Two of the projected

excursions did not take place, but the following were successfully carried out:—June 18, the caves at Ovens (conductor, T. Farrington, M.A.); June 25, Spike Island (marine zoology, conductor, Professor Hartog); our thanks are due to Lieut. R. R. Hoare, R.N., a member of the Club, for kindly providing a special steam launch for the party; June 29, Crosshaven (conductor, Professor Swain, who explained the geology of the cliffs, &c., to a large party); July 9, Ardrum Woods (conductor, Mr. Scott-Kerr, Hon. Secretary, Irish Forestry Society); Mr. and Mrs. Scott-Kerr kindly entertained the members at tea; August 13, Currabinny (a botanical excursion, conductor, Professor H. A. Cummins, C.M.G.), a large party was present; August 20, Belvelly Castle (conductor, Mr. J. Coleman, who gave the history of the castle); November 26, Carrigrohane (conductor, Professor Swain); the formation of the "river-terraces" of the Lee, &c., was explained in the field; this was the first winter excursion ever undertaken by the Club, short excursions at that season being suggested by the President. Professor Swain's Presidential Address—"The Geology of the South of Ireland" was delivered at University College on January 30, to an overflowing audience of members and friends. Dr. A. W. Sandford presided. The Session was brought to a close by F. R. Rohu's lecture on "Our Native and Migratory Birds" (illustrated by specimens) at the School of Art on March 29. Members have responded to the appeal made at our last general meeting with respect to the Municipal Museum. Specimens have been added, and a number of the minerals named. The Hon. Treasurer (W. B. Lacy) submitted his balance sheet, which showed a substantial sum on hands. The report and balance sheet were adopted. The following officers and committee were elected—President, Professor I. Swain, B.A., A.R.C.SC.I., M.R.I.A.; Vice-Presidents, Professor Hartog, M.A., D.Sc., F.L.S.; T. Farrington, M.A., F.C.S.; H. Lund, W. H. Johnson, R. A. Phillips, J. H. Bennet. Hon. Secretary, James Noonan; Hon. Treasurer, W. B. Lacy. Committee:—Mrs. Brooke-Hughes, Messrs. W. Miller, J. Coleman, M.R.S.A.I.; F. R. Rohu, J. Scott-Kerr, George Dobbs, J.P.

MAY 11.—VISIT TO UNIVERSITY COLLEGE.—Thirty members and friends assembled at the Geological Museum about 3.30 p.m., when Professor Swain conducted the party through the collection, beginning with models of the Cullinane diamond and other famous jewels. The Zoological Museum and the Plant-houses were subsequently visited, Professors Hartog and Cummins respectively acting as conductors.

MAY 27.—EXCURSION TO BLARNEY CASTLE.—A large party travelled by 2.40 p.m. train from Muskerry station. After inspecting the historic Castle, the famous "Rock Close" adjacent, and the lake were visited (by kind permission of Sir George Colthurst). The pre-historic remains within the grounds, the rare ferns and other plants, &c., aroused considerable interest among the visitors. Most of the members returned to the city by the 5 p.m. train.

NOTES.

BOTANY.

Two Parasitic Fungi new to Ireland.

On the 26th of May, 1911, during a field excursion with the students, to Portmarnock, I obtained specimens of *Plantago major* with a fungus forming spots on the under side of the leaves. This on examination proved to be *Peronospora alta*, Fuckel, and has not previously been found in Ireland.

On Whit Monday (5th June, 1911) during a visit to the Earl of Drogheda's demesne at Moore Abbey, I observed the leaves of *Rhamnus catharticus*, which is here quite common, infested with the cluster-cup stage of a fungus. This was *Puccinia coronifera*, Klebahn, and like the preceding is an addition to the Irish Flora.

J. ADAMS.

Royal College of Science, Dublin.

Extinction of Cryptogams in Ireland.

In the *Transactions* of the South-eastern Union of Scientific Societies appears a long paper by A. R. Harwood on the extinction of Cryptogamic Plants, to which is appended a "Report upon the Extinction of Cryptogams in Ireland." This report is not the result of personal investigation, and indeed from its perusal we cannot find that the author has ever been in Ireland; it consists of a series of quotations from the opinions of correspondents, some of whom are botanists, and some of whom are not, on the condition of various parts of the country as regards increase or decrease in their cryptogamic flora. The body of evidence is of miscellaneous character and unequal value, and in the absence of any commentary or summary by an editor well acquainted with the districts of which it treats and the conditions prevailing there, it cannot claim much scientific value.

Saxifraga nivalis in Co. Sligo.

Miss Lily Crofton sends me a flowering plant of *Saxifraga nivalis* from its old station near Annacoona on the Ben Bulbin range. She writes:—"Miss Wynne found the Saxifrage growing plentifully in the rocks just along the top. We found dozens of plants." Considering the care with which Messrs. Barrington and Vowell explored this station in 1884, and the small number of plants seen by them ("about 30 plants in one place near Annacoona"—which place, I understand, was a precipitous gully)—it would appear that this rare plant is on the increase in its only Irish station.

R. LLOYD PRAEGER.

Dublin.

ZOOLOGY.

A rare Fly in Co. Fermanagh.

On April 29th, when waiting for a train at Enniskillen Station, I picked up from the platform, alive but in an apparently comatose condition, a fly which was identified at the British Museum as a specimen of *Hytodesia variegata*, Mg.

HERBERT TREVELYAN.

Naval and Military Club, London.

Mollusca of Co. Limerick.

To the *Journal of Conchology* for October, Harry Fogerty contributes a note on the species found in shell-drift near Limerick.

Mollusca from the Glacial Lake near Moira.

Mr. Stelfox informs me that the shells found in the lake marl at Megaberry, Co. Antrim (not Down, see p. 96, *supra*), are *Planorbis glaber*, *Limnæa peregra* and *Pisidium pusillum*—the latter species on the authority of B. B. Woodward, F.L.S.

ISAAC SWAIN.

University College, Cork.

An Addition to the Mollusca of County Limerick.

On March 14th, I obtained a single specimen of *Ena obscura* at Clarina, Co. Limerick, which is an addition to the known list of Mollusca for the county.

HARRY FOGERTY.

Irish Bird Notes.

We glean the following notices of Irish Birds from recent issues of zoological contemporaries :—A pair of Herons breeding twice in 1896 near Ballina (R. Warren in *Zoologist* for September.); an American Blue-winged Teal shot in Co. Cork, in September (R. Warren in *Zoologist* for November, and H. F. Witherby in *British Birds* for January); particulars of spring arrivals of White Wagtails and Sandwich Terns in Killala Bay (R. Warren in *Zoologist* for May); Brambling remaining in Co. Down until June 13 (J. Beddall Smith in *British Birds* for August).

Sparrow Hawk laying twice in same Nest.

On the 30th May last I found a Sparrow Hawk hatching her eggs in the same nest in which a Sparrow Hawk (probably the same bird) had reared her young in 1909. Some new material, fir twigs, appeared to have been added to the upper part of the nest, but otherwise there was no change. In all my previous experience I have always found that a Sparrow Hawk made a new nest every year.

GEORGE C. MAY.

Dublin.

NOTES OF CERTAIN TERRESTRIAL
AND FLUVIATILE MOLLUSCA
FROM GLENGARRIFF, CO. CORK.

BY STAFF-SURGEON K. H. JONES, M.B., F.Z.S., R.N.

THE specimens referred to in the following notes were collected by the writer in the vicinity of Glengarriff, Bantry Bay, at the end of March and the beginning of April, in the present year.

The terrestrial species are not of particular interest, but some of the fluviatile, and especially those of the genus *Pisidium*, require to be carefully considered, if only on account of their geographical distribution. It is, perhaps, doubtful whether *Pisidium hibernicum* and *Limnaea involuta* have previously been collected so early in the year. In the case of each species mention is made of any peculiarities of its habitat, and of the position of the same in relation to Glengarriff. For the identification of the species of *Pisidium* Mr. B. B. Woodward is responsible. The terrestrial species were submitted to Mr. A. W. Stelfox, of Belfast.

The following species were met with :—

Hyalinia nitidula.

Hyalinia pura.

Hyalinia radiatula and var. *viridescenti-alba*.

Hyalinia crystallina.

Zonitoides excavatus and var. *vitrina*.

Pyramidula rotundata.

Cochlicopa lubrica.

All the above species were found abundantly in the woods immediately about the Eccles Hotel.

Helix aspersa was plentiful, and always very thin of shell.

Helix nemoralis was not found at all commonly, and the specimens obtained resembled the last species in the extreme tenuity of their shells.

Limnaea involuta was obtained at Barley Lake, about four miles from Glengarriff, and about 1,000 feet above sea level, where it was first discovered by Mr. R. A. Phillips of Cork. The molluscs were plentiful but difficult to see, all were resting on stones at the water's edge, and individually they were small, only one full-grown specimen was taken.

Limnaea prætenuis was obtained in its original habitat, Lough Nagarriva, but unlike the preceding species, was found on weeds instead of on stones. *Limnaea involuta* could only be collected slowly and carefully by hand, whereas *Limnaea prætenuis* required to be removed with the scoop. The specimens were almost all immature and extremely inclined to be localized in patches, even in the restricted area of this little mountain tarn. They were not very numerous.

Limnaea peregra.—A variety of this species was taken at Loughmore, on the road between Glengarriff and Bantry, at an elevation of about 600 feet, or less. This variety is probably one of the intermediate forms, which there can be little doubt exists between the type and the very aberrant *Limnaea involuta*. The shells are characterized by their great fragility, their deep sutures and the very well marked striation in the lines of growth. Mr. A. W. Stelfox considers this variety to be identical with one obtained by him at Sraheens Lough, Achill Island, West Mayo, in April, 1910, which he has figured in his list of the Land and Freshwater Mollusca of Ireland (*Proc. Royal Irish Acad.*, vol. xxix., Sect. B., No. 3.)

Ancylus fluviatilis.—This species is very common about Glengarriff, the shells are always fragile and usually somewhat small. In Barley Lake, specimens of the variety *alba* were found in considerable numbers and of a good size.

Aciula lineata.—One specimen was taken under moss on the wall of the bridge over the Glengarriff River, beyond the village.

Margaritana margaritifera.—The Pearl-mussel was only actually taken from one locality, the little Owennochahina stream, which flows from Barley Lake into the Glengarriff River. The species is also to be found in the Coomerkane River, and in the lower reaches of the Glengarriff River. The little stream mentioned above is only three or four feet wide, and perhaps two, or two and a half deep, and in it the molluscs are only found in the two hundred yards or so nearest to the river, where the rivulet runs through almost flat meadows. There are no Margaritanae in the Glengarriff River itself at this point, although in the stream they are abundant. The natives capture these mussels by inserting a thin pointed stick between the open valves, which is easily done in clear water, and on it the mollusc at once closes them and is then withdrawn from the bed of the stream, clinging tightly to the end of the stick. The specimens obtained here were rather small, of an elegant shape, and thin of shell. Pearls are said to be rare, so doubtless mussels would be rare also.

Pisidium hibernicum.—A few small specimens were found in Lough Nagarriva, where they appeared to be climbing on weeds.

P. pusillum.—This species was taken in considerable numbers at the two loughs of Avaul, on the road to Castletown and about four miles from Glengarriff. It also occurred very sparingly in Coomerkane Lough, a partially drained lake at the head of the valley of the same name.

- P. nitidum** was only obtained in Little Lough Avaul, the nearer of the two small lakes to Glengarriff, and was not plentiful.
- P. obtusale**.—A very oval form of this species was found sparingly in a peaty pool on the road to Loughmore.
- P. Steenbuchi** was found very abundantly in a small wayside pool in the Coomerkane valley. This pool was not more than six feet square, and contained besides the *Pisidia*, a quantity of algae and innumerable tadpoles.
- P. Lilljeborgi**.—This species was found abundantly at Loughmore.
- P. casertanum**.—This species occurred with the last-mentioned at Loughmore, but was not common.

All the above species were found in the county division known as West Cork, except *Limnaea prætenuis* and *Pisidium hibernicum* which were taken in South Kerry. *P. obtusale*, *P. Lilljeborgi* and *P. Steenbuchi* have not previously been noted from West Cork. *P. Lilljeborgi* has only been previously found in the North-west of Ireland and *P. Steenbuchi* not nearer than County Clare.

H.M.S. "Irresistible," Home Fleet.

A SECOND LIST OF COLEOPTERA FROM THE CO. MEATH.

BY G. W. NICHOLSON, M.A., M.D., F.E.S.

I SPENT the greater part of September, 1910, collecting Coleoptera at Balrath, Co. Meath; during part of the time I had the benefit of Mr. Donisthorpe's company. Although the weather was, on the whole, good, beetles were very scarce indeed, scarcer even than they were the year before.

We, however, succeeded in making three additions to the Irish list. These are:—

GYROPHAENA NANA, Pk.—A single female at the bottom of a hay stack.

GALERUCELLA PUSILLA, Weise.—A few specimens swept off a patch of *Lythrum* on the "home-bog." Hunt as we would, we could find it nowhere else.

LONGITARSUS CASTANEUS, Duft.—One by general sweeping on the "home-bog."

The following is a list of the other interesting species that were captured, and that have not been noted as having occurred in the district in 1909.

Bradycellus similis, Dej. ; *Ilybius ater*, De G. ; *Rhantus notatus*, Berg. ; *Aleochara brevipennis*, Gr., one in carrion ; *A. nitida*, Gr. ; *Homalota aquatica*, Th. ; *Myllaena intermedia*, Er. ; *Megacronus analis*, F. ; *Leistotrophus nebulosus*, F., a very large male on the keeper's boot, as we were examining a carrion trap together ; *Lathrobium terminatum*, Gr. var. *immaculatum*, Fowler ; *Lathrimacrum unicolor*, Steph. ; *Omalium iopterum*, Steph., a single specimen taken by Mr. Donisthorpe on the window of his room ; *Megarthrus sinuaticollis*, Lac. ; *Leptinus testaceus*, Mull., one in a heap of dead bracken ; *Agathidium laevigatum*, Er., not uncommon at the bottom of a hay-stack ; *Necrophorus ruspator*, Er., a specimen which has the anterior orange band of the elytra broadly interrupted (and in this respect resembles *N. interruptus*, Steph.) ; its abdomen, however, is only pubescent at the apex, which proves it to belong to this species ; *Choleva grandicollis*, Er. ; *C. morio*, F., the commonest species of this genus under carrion ; *C. Watsoni*, Spence ; *Pselaphus Heisei*, Hbst., common ; *Hippodamia xiii.-punctata*, L., one by sweeping on "home bog" ; *Hister cadaverinus*, Hoff. ; *Epuraca deleta*, Er., common in fungus ; *Omosita colon*, L., one specimen in carrion ; *Atomaria nigripennis*, Ik., one in hedge-trimmings ; *Lema septentrionis*, Weise ; *Lochmacea crataegi*, Först., a straw-coloured individual ; *Apthona atratula*, All., common ; *Barynotus elevatus*, Marsh.

Cancer Hospital, London, S.W.

NEWS GLEANINGS.

Honours for Irish Men of Science.

We notice with much satisfaction that knighthood has been conferred on Professor W. N. Hartley, Dean of the Royal College of Science, and on F. W. Moore, Curator of the Royal Botanic Gardens, Dublin.

THE IRISH WHALE FISHERY.

BY R. F. SCHARFF, PH.D.

SINCE writing the short article on this subject for the *Irish Naturalist* last November, Mr. Holt very kindly sent me some additional information which may be of interest to the readers of this journal. The exact data of the number of whales killed at the Irish whaling stations during the summer of 1910 were not then available. This information has now been supplied by Mr. Holt.

NUMBER OF SPECIMENS CAPTURED BY INISHKEA WHALING
COMPANY DURING 1910.

Right Whale,	4
Sperm Whale,	2
Common Rorqual,	32
Sibbald's Rorqual,	5
Northern Rorqual,	21
Humpback,	1
	<hr/>
	65 Whales.
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NUMBER OF SPECIMENS CAPTURED BY BLACKSOD WHALING
COMPANY DURING 1910.

Right Whale,	4
Sperm Whale,	5
Common Rorqual,	20
Sibbald's Rorqual,	6
Northern Rorqual,	18
Humpback,	2
	<hr/>
	55 Whales.
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FUNGI FROM THE ANTRIM COAST.

BY W. B. GROVE.

WHILE visiting the Antrim Coast and Glens with a party of the Birmingham Natural History Society, Easter, 1911, the following species were collected, mainly between Larne and Ballycastle. Those marked with an asterisk are additions to the Irish Flora.

UREDINEÆ.

Puccinia Smyrnii, Corda.—On *Smyrnium olusatrum*, coast near Larne.
Uromyces rumicis, Wint.—On *Rumex Acetosa*, Giant's Causeway.

PYRENOMYCETES.

**Didymella hyporrhodia*, Sacc.—Murlough Bay.
 **Diaporthe denigrata*, Wint.—On stems of *Angelica*, Murlough Bay.
 **Gnomonia Cerastis*, Auersw.—On petioles of *Acer Pseudoplatanus*, Murlough Bay.
 **Phyllachora bromi*, Fekl.—On grass leaves, Giant's Causeway.
 **Ophiobolus acuminatus*, Duby.—On *Carduus arvensis*, Cushendall.
Hypoxylon fuscum, Fr.—On Hazel, Glenariff.
Eutypa lata, Tul.—On branch, Murlough Bay.
Nectria coccinea, Fr.—On Beech, Glenariff.
 **Dimerosporium abjectum*, Fekl.—On *Veronica officinalis*, Glenariff.
 **Sphærella rubella*, N. et S.—On stems of *Angelica*, Murlough Bay.

DISCOMYCETES.

Rhytisma acerinum, Fr.—On *Acer Pseudoplatanus*, Murlough Bay, &c.
Hypoderma virgultorum, DC.—On *Rubus fruticosus*, Glenariff.
 **Dasycephala dematiicola*, Mass.—On *Rubus fruticosus*, Glenariff.
Dasycephala clandestina, Fekl.—On *Rubus fruticosus*, Glenariff.
Heterosphaeria patella, Grev.—On stems of *Angelica*, Murlough Bay, &c.
Calloria fusarioides, Fr.—On Nettle stems, Glenariff, &c. (with ascospores.)

DEUTEROMYCETES.

**Leptostroma spiraeae*, Fr.—On *Spiraea Ulmaria*, Glenariff.
 **Phoma complanata*, Desm.—On umbellifers, Glenariff, &c.
 **Phoma urticae*, Schulz et Sacc.—On Nettle, Cushendall.

Specimens of most of these have been deposited in the Fungus herbarium of the University, Birmingham.

Birmingham.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Ring-tailed Lemur from Lady Henry Robinson, a Serval cub from Dr. J. McConaghy, two young Dingoes from Mr. G. Tyrwhitt Drake, a Stoat from Mr. E. Barrington, Hedgehogs from Mr. L. Hensworth and Mr. P. Leddy, a Peregrine Falcon from Mr. R. M. Barrington, a Kestrel from Mr. W. W. Despard, four Griffon Vultures from Capt. T. E. Ke'sall, a Muscovy Drake from the Hon. Mrs. T. Collins, a Long-eared Owl from Mr. J. Moneley, an Alexandrine Parakeet from Mrs. Hamilton, and a Gannet from Mr. B. E. Hillas.

DUBLIN NATURALISTS' FIELD CLUB.

MAY 20.—EXCURSION TO BEAUPARC.—Thirty members and visitors travelled by the 3 p.m. train from Amiens Street under the conductorship of Alex. McHenry, M.R.I.A. The weather was perfect, and on arrival at Beauparc the party walked to the copper mine where they were received by Mr. Murray, the manager. After an examination of the copper ore (copper pyrites), extracted from the mine, had been made, the manager proceeded to explain in detail the various processes through which it passed after being brought to the surface, in order to prepare it for the market. Most of those present then descended the mine by means of ladders, each of the male members carrying a small oil lamp. Three galleries in all were inspected at depths of 80, 140, and 180 feet, respectively. At each of these levels copper ore was examined *in situ*, and although progress was slow owing to the quantity of water in the mine, the party traversed the whole length of each gallery visited. It was not possible to descend to the 200 feet level, as this gallery was flooded with water, the depth in some places exceeding 5 feet. The party returned to the surface at about 6 o'clock, and were entertained to tea by Mr. D. Frame, managing director of the mine. This concluded a most enjoyable and successful excursion, and the return to Dublin was commenced at 7.35 p.m.

JUNE 10.—EXCURSION TO LAYTOWN AND THE BOYNE ESTUARY.—Under the leadership of W. F. Gunn, a small party left Amiens Street terminus at 10.45. The day was ideal for the trip, and the climatic conditions favourable for collecting. After a short stay about the mouth of the Nanny River, the party headed for the mouth of the Boyne, and for the first two miles were occupied in shore-collecting. Nothing of special interest was found, the principal shells being *Aporrhais pes-pelican* and *Natica catena* and large numbers of the empty cases of sea-urchins. A move was then made for the sand-dunes, where after lunch was partaken of, a careful search was made by the botanical members, and the usual sand-dune type of flora studied. Amongst the plants observed were *Viola Curtisii*, *Festuca uniglumis*, *Euphorbia paralias*, *E. portlandica*, *Cynoglossum officinale*, and *Lycopsis arvensis*. On the muddy and marshy ground near the "Maiden Tower," *Salsola kali*, *Salicornia herbacea*, *Glaux*

maritima, *Statice rariiflora*, and *Spergularia marina* were seen in quantity. From this point the turnpike road to Drogheda was taken and *Geranium molle*, *Chelidonium majus*, *Lamium album*, *Festuca rubrocollisoides*, and (near Drogheda) *Matricaria discoidea* were the more noteworthy plants encountered. At Stagrennan a short halt was made, and the fine exposure of evenly bedded Carboniferous limestone was examined, and its features explained by Mr. Hinch. As no zoologists were with the party, few notes of animals were made, but large numbers of the local snail *Helix pisana*, and the pupa-cases of the Six-spotted Burnet-moth *Zygaena filipendulæ* were seen on the sandhills. After a well-earned tea at the Central Hotel, and a short ramble through the town and up the river, the members returned to the City by the 8.14 train.

BELFAST NATURALISTS' FIELD CLUB.

MARCH 18.—BOTANICAL SECTION.—A paper entitled "Mosses and Liverworts" was read by Rev. CANON LETT, M.A., M.R.I.A.

MARCH 21.—The President (Robert J. Welch, M.R.I.A.), in the chair. JOSEPH WRIGHT, F.G.S., read two short papers, one on "Boulder Clay from the North of Ireland, with Lists of Foraminifera," and the other "Foraminifera from the Estuarine Clays of Magheramorne, County Antrim, and Limavady Station, County Derry." Some years ago he received from friends a number of packets of Boulder Clay from the North of Ireland, all of which were found to contain Foraminifera. Three were of more than ordinary interest, being from high altitudes in the vicinity of Belfast. One, given by Mr. W. H. Milligan, was from the back of Black Mountain, at 900 feet O.D.; the other two were from their late fellow-member, Mr. S. A. Stewart, A.L.S., taken near the summit of Divis Mountain, at 1,000 and 1,300 feet O.D. He then referred to the estuarine clays at Magheramorne and Limavady, which, he said, were the most interesting deposits of the kind in Ireland owing to the quantity of specimens and number of rare forms found in them. The microzoa as well as the clays themselves were very dissimilar at these two places. At Magheramorne the foraminifera were large in size, the clay also containing numbers of molluscan shells, *Ostrea edulis* and *Pecten maximus* being exceptionally large. This clay resembled recent deposits at moderate depths under favourable marine conditions. At Limavady the foraminifera were smaller and in much greater profusion, while the clay itself was soft and fine, with few, if any, molluscan shells, and resembled the mud now deposited in the estuaries of some of our rivers and bays. These Post-tertiary clays yielded many rare and interesting forms, four of the species and varieties being new to science. The paper will be published as an appendix to the Club's proceedings.

Dr. W. J. DAKIN, of Liverpool University, read a paper on "Plankton Studies." The term plankton was first used by the German physiologist Hensen in 1887. It includes all those small animals and plants which are to be found floating in the waters of lakes or oceans. These organisms can be easily captured by tow-nets of extremely fine silk. The study of

the plankton has of recent years become very important, and many biological problems, both economic and scientific, are awaiting solution, when the results of detailed research are known. Thus the great question of the food of fishes, and indirectly therefore the food of man, is bound up with the plankton. Many fishes feed directly on these small organisms floating in the water. Other fishes feed on somewhat larger animals, but even these depend indirectly on planktonic life, which forms the last link between the minerals dissolved in the water and the complex organic compounds devoured by the lowest animals. Amongst the microscopic animals there is a continued struggle, the larger and better-armed feeding upon the smaller and weaker, and the plankton caught at any time represents in fact the results of the conflict. The constitution of the plankton depends, however, in addition to this, on meteorological conditions. We find plankton present in Lough Neagh in great abundance all the year round, but the organisms are by no means the same at different seasons. There are some characteristic winter forms; others appear first in spring, and soon become very abundant and then die off towards summer. All the interesting changes can only be followed by an investigation of the water at regular intervals through a period of at least one year. As far as the plankton is concerned, the water of Lough Neagh is very prolific. For the whole year there is a total volume of plankton produced, per cubic metre, which exceeds that of the water of the Irish Sea. This plankton is very similar in character to that of some North European lakes and differs considerably from that of the Scottish lochs and lakes of the English Lake District. The resemblance to certain North German lakes is still further increased by the presence of *Mysis relicta*, which though not strictly speaking a planktonic organism, must be considered with the plankton. Whereas on land the most productive regions are in the tropics, the conditions are reversed in the water, and both fresh water lakes as well as the seas and oceans in temperate and Arctic regions are far more productive, as far as plankton and fish life is concerned, than tropical waters.

MARCH 29.—ARCHAEOLOGICAL SECTION.—MRS. HOBSON read a paper entitled "The 'Fogous' and other Cornish antiquities." The paper, which was illustrated by lantern slides, was followed by an interesting discussion.

APRIL 25.—The President (Robert J. Welch, M.R.I.A.) in the chair. F. BALFOUR BROWNE, M.A., F.Z.S., presented his report as delegate to the Corresponding Societies' Conference of the British Association. A discussion followed upon points raised in the delegates' report, in which the President, Dr. Derryhouse, N. H. Foster and H. L. Orr joined. J. A. S. STENDALL read a paper on "Rare old Chester."

APRIL 28—ANNUAL MEETING.—The President (ROBERT J. WELCH) in the chair. The Hon. Secretary (A. W. STELFOX) read the forty-eighth annual report. During the season just ended twenty new members were elected, of whom eighteen have qualified for membership by paying the necessary fees. Against this there have been seven deaths and twenty-two resignations, leaving the membership of the Club on 1st April, 1911, at 386. The death of S. A. Stewart, one of the five founders

of the Club, has left a breach which for many years is not likely to be filled. A sum has been raised and a monument, consisting of a rude standing stone, with inlet bronze medallion, is being erected upon Stewart's grave to perpetuate his memory. The death of Professor T. Rupert Jones, of Chesham, Bucks, one of the three honorary members of the Club, will be deeply regretted. Professor Jones was formerly professor of geology at Sandhurst, and gave great assistance to those of our members engaged in study of foraminifera. A considerable amount of field work was accomplished on the occasion of the summer excursions. The winter session was inaugurated by the usual conversazione and lectures, and papers were delivered at the ordinary monthly and sectional meetings. F. Balfour Browne, M.A., again represented the Club at the British Association Conference of Delegates, held in Sheffield in September. The statement of accounts shows a balance in favour of the Club. The Treasurer (W. H. PHILLIPS), submitted the statement of accounts. The report of the botanical section was read by N. CARROTHERS, the geological report by W. J. C. TOMLINSON, the zoological report by JOSEPH MAXWELL, and the archæological report by A. W. STELFOX. These reports were adopted on the motion of the President (Robert J. Welch), seconded by F. A. Heron. William Chambers proposed and George Raymond seconded the re-election of Robert J. Welch as president, a motion which was passed by acclamation. W. J. C. Tomlinson was re-elected vice-president; W. H. Phillips treasurer; Sylvanus Wear, librarian; A. W. Stelfox, Hon. Secretary. The following ten members of committee were elected:—Robert Bell, F. Balfour Browne, N. Carrothers, A. R. Derryhouse, W. J. Fennell, N. H. Foster, John Hamilton, W. A. Green, H. L. Orr, and Robert Patterson. A vote of thanks to the retiring Hon. Secretary (Miss Jean Agnew) was proposed by Joseph Maxwell and seconded by Robert Patterson. A long discussion upon several points in connection with the rules of the Club took place, the most important being that proposed by J. A. S. Stendall—namely, the formation of a junior section of the Club at reduced subscription. The question of altering the method of election for committee was raised by F. Balfour Browne, who proposed that a certain proportion of the retiring members should be ineligible for re-election for one year. Several members having spoken in favour of these changes in the rules, the President pointed out that nothing could be done at the present meeting, as no notice had been given beforehand of the proposals. Suggestions for places to be visited on the summer excursions having been received, the meeting terminated with the election of two new members.

JUNE 3.—GEOLOGICAL SECTION.—BALLYDOWN QUARRIES, ISLANDMAGEE.—Leaving Belfast by the 2.15 p.m. train, the members travelled to Magheramorne, and proceeded by special boat to Mill Bay, Islandmagee. The old Chalk quarries at Ballydown, about a mile to the north, were then visited. These still exhibit excellent sections of the Cretaceous strata, including the Glauconitic Sands, Chloritic Sandstone, and Upper Chalk. A few fossils, including *Exogyra conica*, *Pecten orbicularis*, and *Belemnites mucronata* were obtained, and an interesting specimen of flint showing

the radiating structure of a sponge was examined. Calcite was fairly common, and at one place good examples of dolomite crystals were found. On leaving Ballydown, the walk was continued to Ballylumford, where a local development of iron-ore beds, in the interbasaltic series, was examined with interest. The pisolitic ores, formerly mined here, yielded from 30 to 65 per cent. of metallic iron, and some of the beds contained a good percentage of free alumina. The party crossed to Larne Harbour by motor boat, and after tea, left the Harbour Station for Belfast by the 8.10 p.m. train.

JUNE 17.—EXCURSION TO KILLARD POINT, KILCLIEF CASTLE, and STRANGFORD.—Notwithstanding the heavy rain on Friday night and a falling barometer, fifty members and friends travelled to Downpatrick by the twelve o'clock Newcastle express, which, by the courtesy of the railway officials, was stopped at Crossgar to allow the party to change into the Downpatrick train, which followed a few minutes later. Brakes were in waiting, and the party proceeded to Ballyhornan Bay and the promontory of Killard, where they were timed to arrive at 2.15. On the way the holy wells of Struell, attributed to St. Patrick, were pointed out, also the remains of a prehistoric stone circle. The absence of dust, owing to the previous night's rain, made the drive most enjoyable, and the air was fragrant with the perfume of wild roses and honeysuckle. Arrived at Killard, the party dispersed over the promontory for lunch and natural history work, the botanists especially meeting with good success. At 3.30 the drive was continued to Kilclief Castle, which was entered and examined by a number of the party, while a short paper supplied by W. Gray, M.R.I.A., describing the ancient fortress, was read. Strangford was reached about 4.30, where the party was entertained to tea by the Rev. Charles K. and Mrs. Pooler, of Downpatrick. Afterwards a short business meeting was held, Dr. Derryhouse occupying the chair, and expressing the thanks of the Club to Dr. and Mrs. Pooler on this the second occasion of their kindness to the members. He was ably seconded by the Rev. Dr. Hamilton, Vice-Chancellor of Queen's University, Belfast, and after the election of five new members and an announcement regarding a new rule of the Club by which a junior branch is to be inaugurated for younger members, with special features and facilities for natural history study, the meeting terminated. Before starting on the return journey a number of the party visited the garden and demesne of Oldcourt, the seat of Baron de Ros. On the return journey to Downpatrick, the very old church of Raholp was passed, believed to be the second oldest church in the county.

Among the plants noted on the excursion may be mentioned *Calystegia Soldanella*, Houndstongue, and the Sea Holly, *Eryngium maritimum*, The four common species of woodlice and *Armadillidium vulgare* were abundant at Killard, while *Trichoniscus roseus* and *Cylisticus convexus* occurred in the greenhouse at Oldcourt. The common snail *Helix aspersa* was present everywhere, and *Pupa muscorum* and *Helicella barbara* were taken at Killard Point.

NOTES.

BOTANY.

Secale cereale in Co. Donegal.

When exploring some of the waste land and sandhills in the vicinity of Rossnowlagh, Co. Donegal, on June 10, I gathered a grass which I did not know. I sent a specimen to Mr. Praeger, and it has been identified by Miss Knowles from specimens in the Herbarium in the National Museum. There were, perhaps, forty or fifty heads distributed sparingly over some sandy, marshy ground, near to the sandhills and about a quarter of a mile from the sea. The place is nearly midway between Ballyshannon and Donegal, not near a sea-port or railway. The district is thinly populated, and there is very little cultivation, the land being mostly pasture and old meadow. It is not easy to conjecture how the grass has been introduced, as there are few more secluded and out-of-the-world parts of Donegal than its present habitat.

M. J. LEEBODY.

Londonderry.

ZOOLOGY.

Some New Irish Barnacles.

Certain barnacles belonging to the genus *Scalpellum* obtained by the Fisheries Branch of the Department of Agriculture within the Irish marine area, were sent to Dr. Annandale of the Calcutta Museum to be named. Dr. Annandale reports (*Ann. and Mag. Nat. Hist.* (8) vol. vii., pp. 588-590, 1911), that most of them belong to the two common species *S. vulgare* and *S. velutinum*. A single specimen, however, which was secured from a stem of *Lophohelia* in about 700 fathoms off the west coast of Ireland, seemed to him new, and is now described as *Scalpellum (Smilium) Kempi*. Dr. Annandale adds that he understands the specimen is to be deposited in the British Museum.

A New Irish Breeding Bird.

I have just found a colony of the Fulmar Petrel breeding on the west coast of Ireland, and I hope to publish an article on the subject in the September number of the *Irish Naturalist*.

Cappagh, Co. Waterford.

R. J. USSHER,

REVIEW.

The Lore of the Honey Bee, by TICKNER EDWARDES. London: Methuen & Co. Price 1s.

Messrs. Methuen first published this book in 1908 at 6s., it was then in crown 8vo form and had 24 illustrations, now it is in fcap. 8vo size without the illustrations, and costs 1s. It was reviewed in these columns on its first appearance, and has since been through three editions, so has evidently found a public. This is not surprising, as the author's style is most readable and his evident love for his bees infects his readers with the same feeling. In its present handy form and neat binding it should have a still wider circulation.

G.O.S.

THE FULMAR PETREL BREEDING IN IRELAND.

BY R. J. USSHER, D.L., M.R.I.A.

ON the 10th of July, 1911, in company with my friend Herr Lindner, a German pastor and a most observant ornithologist, I was greatly surprised to find a colony of Fulmars breeding on a lofty, perpendicular cliff on the north coast of Mayo. I had previously only seen this species on the wing when out at sea off the west coast, and I had never visited a breeding-place; so I will describe the birds as I found them. It may help others to identify them elsewhere, and I trust that when they do so they will do nothing to disturb or molest these new settlers.

My boatmen told me in reply to my enquiries about shearwaters that there were white "Cawnoges" in one of the cliffs, and that they had first appeared there about four years ago, and were increasing.

They took us to the place referred to, a cliff 700 feet high. It forms a bastion, battering a little at the bottom where a colony of Kittiwakes are breeding. All its central portion is perpendicular, and it overhangs a little at the top, while the grassy slope above it comes down quite steeply affording no standing-ground to work a rope if one wanted to descend. Small colonies and scattered pairs of Razorbills and Puffins were in occupation of nooks and ledges on the face of the cliff, but high up my conductor pointed out to me some few birds on the wing, seemingly about the size of Herring Gulls, but differing from any gull in form, the wings being stretched straight out and not shewing the angle at the carpal joint so conspicuous in a flying gull. These birds were gliding in circles, sometimes giving a few quivering flaps, but usually holding the wings level and motionless. We saw one or two alight on the great cliff beside birds that resembled them, and were doubtless their mates.

Next morning we climbed the mountain of which this awful cliff forms the edge, and, finding the spot, I examined it from the projection of the next cliff-top with a 12-power Zeiss binocular. I could now see from above the birds

wheeling on the wing; their upper surface was grey, but not of the bright bluish-grey of the Herring Gulls and Kittiwakes; some were of a browner grey and some of a more ashy grey, and a few had darker and lighter shades in their mantle, giving them a parti-coloured appearance.

I then examined the birds sitting on their nesting-places; these were not crowded together like those of Kittiwakes, but on ledges scattered here and there along the cliff-face, and appeared to be earthy, and in some cases, at least, edged with growing vegetation; occasionally in a recess overhung by the rock above. In one instance I saw two birds sitting on the same ledge close together. I remarked that a hatching bird sat with her white head and neck held upright, as in Mr. Kearton's photograph of a Fulmar on her nest,¹ and not in the crouching attitude of a gull, while the wings appeared to be drooped loosely from the body.

I counted eighteen of these sitting Fulmars, but there were probably more out of my range of view; all that I saw were about the same part of the cliff, which I believe to be about 400 feet above the water. The Herring Gull will occasionally breed on similar ledges, but scarcely so high up; and these birds, from their form, deportment, and manner of flight, differed conspicuously from gulls.

I had now assured myself that they were Fulmars, but in the afternoon, when we were returning from some islands, several of them flew close past and round our boat with the peculiar gliding flight, not unlike that of a shearwater; we could see their thick heads, and recognised them plainly as Fulmars. They flew to the breeding cliff I have described.

On the 14th July, as we were sailing to Black Rock lighthouse, and not far from our destination, we met with one Fulmar and also a Manx Shearwater, and had an additional opportunity of observing their flight.

Since my brief notice of the above discovery appeared in the *Irish Naturalist* (p. 148) I have been informed by Mr. Nevin H. Foster that Messrs. Herbert Malcomson and

¹ "Our Rarer British Birds," page 76.

Ernest Green saw a colony of about twenty Fulmars on an Ulster cliff in May of this year, and were informed that these birds first appeared in the locality the previous year and remained during the breeding season.

Hitherto Fulmars have been chiefly known to us in Ireland as oceanic birds, to be met with (as Mr. Farran reports) at all seasons when one goes about 20 miles into the Atlantic. They seldom or never have been met with on shore, except when storm-driven, and in a dead or dying condition, and their breeding-range has never before extended in Europe so far south as Ireland. They have been known to breed in great numbers on the St. Kilda islands as long as there is any record; and since 1878, when they bred on Foula (Shetlands), they have extended their range from point to point among the islands of northern Scotland and the coasts of Sutherland and Caithness. Mr. Harvie Brown has kindly sent me a map showing the dates when Fulmars were first found breeding in the several localities, and I am glad to learn that he is preparing a full statement on the subject, which will shortly appear in the *Annals of Scottish Natural History*. He remarks, after some discussion:—"I think there remains no doubt now that the Irish Fulmars are true offshoot colonies, uninfluenced by any whaling operations."

It has been suggested that the advent of these birds to our coasts has been brought about by the establishment of two whaling-stations, at Inishkea and at Blacksod Bay, but I am unable to attach much weight to this suggestion. These whaling-stations are situated on the west coast, at a distance by sea of more than twenty-five miles from the Fulmars' colony, which is on the north coast, and the latter is between ninety and a hundred miles from the cliff on which Mr. Foster's friends found birds of the same species in May, 1910. It is true that whales are towed in to the stations, where they are cut up; but every portion of their bodies is there used up, and no Fulmars are to be seen in the neighbourhood of these stations.

I understand moreover, that the whaling steamers chiefly go west from the Irish stations, and how this

could attract the birds to the north coast of Ulster, or even to the north coast of Mayo, I fail to understand.

It is, however, plain that the Fulmars are increasing and spreading on the coasts of the British Islands, and fresh breeding stations may be looked for on Irish cliffs.

Cappagh, Co. Waterford.

FURTHER NOTES ON THE FULMAR.

BY R. M. BARRINGTON, M.A., F.L.S.

My friend Mr. Ussher has kindly permitted me to read his account of the Fulmar nesting in Mayo—a most interesting, but not unexpected, discovery, for probably no other European bird has so continuously extended its breeding range during the past hundred years.

Darwin (*Origin of Species*, ed. 4, p. 78) says it is the most numerous bird in the world, but Professor Newton thinks (*Dict. of Birds*, p. 296) that to render such a statement probable, its Pacific and also its Antarctic representative must be united with it. Anyhow, the Fulmar Petrel, as we know it, is one of the commonest oceanic species between Europe and America, and though only about the size of a Common Gull, it is the nearest representative of the Albatross in the North Atlantic. It has been confused time out of mind with various species of gull by the passengers on our Atlantic liners, and these gulls have frequently obtained credit for the great buoyancy and gracefulness of flight so characteristic of the Fulmar.

Mr. Harvie Brown, in his *Fauna of the North West Highlands and Skye* (1904, p. 359), is surprised at its absence from Ireland, for he says—"I will only ask one question, viz.—How is it that no expansion has yet become evident to the coasts of Ireland?" and subsequently, in letters to me, suggested Donegal and Rathlin Island as probable early settlements.

At one time the Fulmar was, with the single exception of St. Kilda, an almost Arctic breeding species.

In 1839 it was first noticed at the Färoe Islands, midway between Shetland and Iceland. I visited a station there, situated on the remote island of Myggenaes, twenty years ago, and found a considerable colony there.

In 1878 it was observed breeding on a cliff about 1,100 feet high on Foula, one of the most inaccessible of the Shetland Isles. When I inspected this locality the birds chiefly occupied the top 100 feet of the cliff.

About 1891 the Orkney Islands were reached, and in 1898 my old friend Howard Saunders found them on the mainland of Scotland, at Cape Wrath; thence they have spread round the coasts of Sutherland and Caithness, and extended to the Flannan Isles, &c.

The old station at the "south isles of Barra," said by Gray (*Birds of the West of Scotland*, p. 449) to have been abandoned in 1844, is a doubtful record.

During a prolonged stay on St. Kilda, I frequently descended the face of the Great Cliff (Conacher, 1,400 feet) with the St. Kildeans when catching Fulmars and other sea-birds, being specially interested both in the birds themselves and in the climbing abilities of the natives; for, as a member of the Alpine Club, I was anxious to compare their skill with that of the Swiss guides.

The Fulmar makes no nest; it usually selects ledges, with some kind of vegetation scattered here and there, generally grass, and chooses a natural depression, either on grass or on the rock behind it, and here it lays its single white egg. It is very tame, and sometimes remains sitting until the intruder is within 3 feet, when it ejects with some force about half a wineglassful of strong-smelling oil, the scent of which is extremely difficult to remove from one's clothes.

When I visited the Mayo station with Mr. Robert Warren during the first week in August this year, most of the Fulmars had left, and only four or five old birds and a couple of nestlings remained. The situation was probably the most inaccessible I have seen, midway on the north-east face of a perpendicular cliff about 700 feet high.

The Fulmar is so abundant, its breeding stations are now so numerous, and its eggs quoted at such low price in dealers' catalogues, that I have no fear of its extermination. Its occurrence in Ireland is but part of the great overflow from St. Kilda and stations further north, which has been in progress since Färoe was first colonised, seventy-two years ago, and which has not yet been arrested.

Its extension has no more to do with whaling stations than (to use the old illustration) "Tenterden steeple has to do with the Goodwin Sands," for no Fulmars are to be seen near the Irish whaling stations, and every particle of blubber, bone and blood, is now used up at the factories for oil or manure.

The flesh of the Fulmar I ate at St. Kilda resembled boiled chicken; it is delicate in flavour, and has scarcely any fishy taste.

In Colgan's paper on Irish Plant and Animal names on Clare Island, *Proc. R.I.A.*, 1911, p. 21, "White Caurogue" is applied to the Hooded Crow—which in N. Mayo is called Finnogue. I mention this as "White Cawnogue" and "White Caurogue" sound so much alike.

Fassaroe, Bray.

ON TWO EXOTIC SPECIES OF WOODLICE FOUND IN IRELAND.

BY NEVIN H. FOSTER, M.B.O.U.

As announced in this Journal, p. 95 *supra*, in the course of collecting in the greenhouses of the Botanic Gardens Park, Belfast, in company with Messrs. A. W. Stelfox and R. J. Welch, we took some small white woodlice which have proved to be new to the Irish fauna. Doubtless these animals were introduced with imported plants, but as they may be found elsewhere in this country under similar conditions, and as nothing respecting them has hitherto been published in English, it has been considered advisable that their characteristics should be now recorded. The specimens taken were submitted to Mr. D. R. Pack Beresford and were

sent by him to Professor Budde-Lund, who confirmed the identification. I have to thank Mr. Pack Beresford for his valuable assistance in establishing the identity of these woodlice, and for searching out the information concerning them which is embodied in this paper; also Mr. Davis, the curator of the park, for assistance on various occasions.

Trichorina tomentosa, Budde-Lund.

Alloniscus tomentosus, Budde-Lund.

Bathytropa thermophila, Dollfus.

The following is taken from Professor Budde-Lund's description of *Alloniscus tomentosus*, which he afterwards changed to *Trichorina tomentosa*. "Body oblong oval, rather convex; the whole surface very densely furnished with scaly hairs. Antennæ unknown. Eyes small, simple. Frontal lobe of the head slightly produced; lateral lobes small, rounded. Posterior, edge of first body-segment curved, of the three succeeding segments nearly straight or very slightly curved at each side; suture lines being visible on segments 2, 3, and 4. Telson triangular, short, twice as broad as long, with obtuse apex slightly projecting beyond the lateral plates of the last abdominal segment. Colour white. Length 3.5 mm., width 1.5 mm." The above description is of a single specimen taken by Dr. Meinert at Las Trincheras, Venezuela, in December, 1891. M. Adrien Dollfus describes this species from specimens taken in a hot greenhouse in the Jardin des Plantes, Paris, under the name *Bathytropa thermophila*, and says that the antennæ have a biarticulate flagellum, the proximal joint being only one-third the length of the distal joint. He further states that the telson is as long as broad, and cites the dimensions of this woodlouse as $2\frac{1}{4} \times 1$ mm. In our opinion the specimens taken in Belfast are more readily recognisable from M. Dollfus' description than from that of Prof. Budde-Lund. About a dozen specimens of this species were obtained in Belfast, several of them being mature, and some of these have been placed in the National Museum, Dublin. Although the British Museum (London) possesses specimens

of *Trichorina tomentosa* taken in Kew Gardens, we are not aware that any notice of this species having been taken in the British Islands has hitherto been published.

Nagara nana, Budde-Lund.

Of this species we obtained only a single specimen in the Belfast Botanic Gardens, which has been retained by Prof. Budde-Lund, who writes that it agrees with his published description of the species, from which we take the following. "*Nagara* is a sub-genus of *Porcellio*. *N. nana*—Surface minutely granular especially on the head and in the middle of the first segment; the rest of the surface thickly covered with minute scales. Antennæ scarcely exceeding in length one-third of the body; all the joints of the peduncle thickish, the proximal joint of the flagellum small, one-third the length of the distal joint. Lateral lobes of the head rather small, median lobe prominent and slightly curved forwards. Clypeus slightly convex. The posterior edges of first and second body segments strongly curved, of the third segment nearly straight. Abdominal segments 1 and 2 short, the lateral plates of segments 3, 4, and 5 mediocre, separated, roundly triangular. Telson slightly projecting beyond the lateral plates of last abdominal segment, triangular, with its sides curved broadly inwards, slightly concave above, with sharpish apex. Colour grey, with paler oblong spots on the body; segments forming a pale longitudinal line; legs white; antennæ often whitish. Length, 4·5-4·7 mm., width 2·3-2·5 mm. This species was found by Dr. Voeltzkow at Lokube on the island of Nossibe, off the N.W. coast of Madagascar, in 1895, and by Commandant Dorr, at Ankarefa and Tamatave, East Madagascar, in 1897." So far as we can ascertain, these are the only published references to this species.

REVIEWS.

A PRIMER OF EVOLUTION.

Evolution. By PATRICK GEDDES and J. ARTHUR THOMSON. Pp. 256.
London: Williams and Norgate (Home University Library of Modern Knowledge). Price 1s. net.

Prof. Thomson is acting as Editor for the scientific volumes of this admirable series, the readers of which may congratulate themselves that he has himself undertaken, in collaboration with Prof. Geddes, to write this most important contribution to the biological section. There have been not a few small books on the great subject of evolution published during the last thirty years; the distinctive mark of this one is the human and especially the social standpoint from which the subject is approached. For example, the presentation of the "evidences of evolution" begins with a few suggestive lines on Darwin—"the supreme field-naturalist at once widest and intensest"—as influenced by his voyage on the "Beagle." Each step in the argument is linked with the personality of some distinguished investigator, and every conclusion serves to throw light on some problem of human life. A sentence from the conclusion of the third chapter, on "Great Steps in Evolution," well illustrates the tone of the writers' minds and the trend of their thought: "Hygiene, engineering and irrigation, agriculture and forestry, and all such strenuous careers are already opening perspectives lately undreamed by youth, struggles for existence nobler and more sustainedly strenuous than those of war." In their comments on the anti-social deductions drawn by certain modern students of heredity and on "the incipient art of Eugenics," our authors rightly point out that "the greatest practical controversy of our science, in comparison to which all others have been but academic" is "that ultimately between the Herodian and Magian view and treatment of the child, and between essential renewals of the Caesarist and of the Christian ideals of the community."

Turning to the more strictly biological aspect of the subject, we find almost every question that has divided naturalists into opposing schools during the last half century is discussed wisely and impartially. The space at the authors' disposal is, of course, restricted, but so suggestive are their brief remarks on use-inheritance and selection, biometrical and Mendelian methods, mnemonic theories and vitalism, that the student cannot fail to gather many valuable hints and to receive fresh light on the controversies of the day as he reads the pages of this handy little book. In the last chapter: "The Evolution Process once more Reinterpreted," the authors give us, "not dogmatically pressed but suggestively offered," a reasoned plea for the cardinal importance of the organism itself as the

centre through which definite variations are worked out, the antithesis of nutrition and reproduction—as might be expected from former speculations of theirs—taking a prominent place. On this view of the evolutionary process, “the importance we have been taught by Darwin to assign to natural selection becomes greatly changed—from selecting and accumulating supposed indefinite variations, to that mainly of retarding definite ones, after their maximum utility has been independently reached . . . it furnishes the brake rather than the steam or the rails for the journey of life.” It is perhaps likely that future research will justify our authors’ belief in the importance of “definite variations.” As things are, it is well that such speculations should not be “dogmatically pressed.”

G. H. C.

AN INTRODUCTION TO ZOOLOGY.

The Animal World. By F. W. GAMBLE, F.R.S., with Introduction by Sir Oliver Lodge, F.R.S. Pp. 256. London: Williams and Norgate (Home University Library of Modern Knowledge). Price 1s. net.

In this brightly-written volume the reader will find an excellent introduction to the study of animal life. Prof. Gamble’s book is not a condensed zoological text-book of the ordinary kind, but comprises a series of vivid sketches of various aspects from which animals may be regarded. Opening with a chapter on structure and classification, he gives us successively accounts of Animal Movements and Distribution, the Quest for Food, Breathing, Colour, Senses, Societies, the Care for Young, Life-Histories, and finally Heredity and Variation. It may perhaps be doubted if the first chapter is well adapted to lead a beginner into zoological paths. To introduce at once the unfamiliar Protozoa, and then the groups of the animal kingdom set forth in terms of the germ-layer and coelom theories, runs counter to the sound educational practice of leading the learner from the known to the unknown. Nevertheless this first chapter is a masterly piece of summarised writing.

The subsequent chapters, treated from the physiological or the bionomic standpoint, are thoroughly attractive and inspiring; nothing more likely to arouse interest in animal life can be imagined. Old and familiar facts may here be found in a new setting, combined with many recent discoveries, and the reader cannot fail to realise that zoology, truly conceived, is a study of life and function. Among the few inevitable slips it may be pointed out that the rostrum or modified second maxillæ of the Hemiptera is not a lancet-like instrument or a piercing hollow spine (p. 82), but the sheath in which the actual piercers—mandibles and first maxillæ—work to and fro. The book is illustrated by a number of useful but roughly executed drawings.

G. H. C.

BRITISH AND IRISH BIRDS.

The British Bird Book : Edited by F. B. KIRKMAN, B.A. Oxon.
Parts II. to V. London and Edinburgh: T. C. & E. C. Jack.

The expectations that were raised by the issue of Part I. of the *British Bird Book* (reviewed in the December number) are more than fulfilled by the succeeding Parts (II. to V. inclusive), which not only impress one at sight by the great beauty of the numerous coloured plates, but also repay attentive reading by the originality with which many of the chapters are written and the general truthfulness to nature that is shown in all. Irish naturalists will be pleased to find that the newly distinguished Irish Dipper and Irish Coal Titmouse are duly recognised in their proper places in Parts III. and V., though Part I., in which the Corvidae are dealt with, had unfortunately appeared too soon to allow of a similar compliment being shown to the Irish Jay. One is inclined to ask whether, now that these distinctions have been made out, Mr. Jourdain, who contributes most of the notes on distribution, should have stated without some indication of uncertainty that the British Coal Titmouse "occurs in the Isle of Man." This is, no doubt, probable, in view of the fact that the Coal Titmouse of the Isle of Man is generally supposed to be only a recent settler—even more recent than the Blue Tit—in that island. This belief, however, only lends additional interest to the question whether the Coal Tit of Man marks a departure from the general rule of affinity, which so strikingly connects the Manx and Irish faunas.

One of the most interesting chapters in any of the five parts that have yet appeared is Mr. Kirkman's careful study of the Robin, in the course of which he presents us with a map showing how a particular piece of land under his observation was parcelled out during winter among six individual Robins, none of whom would tolerate any trespass on the part of any of his neighbour Robins on his jealously watched domain. It was, as Mr. Kirkman says, no easy matter to define the limits of the several properties, since to do this one had to guard against the risk of confusing the identity of neighbouring Robins; but it will be acknowledged by all ornithologists that the result of Mr. Kirkman's care was well worth the labour. An examination of his map shows that some of the six birds had to content themselves with absurdly small areas, while others, presumably the best fighters, possessed properties of considerable size and value but these last were ceaselessly on the look-out to punish intrusion, and it would probably have been quite impossible for a seventh Robin, unless by expulsion of one of the original six, to establish himself anywhere within the area under survey.

Some doubt may be expressed as to whether Mr. Kirkman does not dismiss too summarily the belief that the Nightjar's pectinated claw is sometimes of use in enabling the bird to hold its position sitting lengthwise on its perches. His chief argument to the contrary—that the pectinations are of too yielding a character to be of use in preventing side slips—would be a strong one if the bird always roosted in such a

position as is shown in Mr. Seaby's singularly beautiful plate—one of the finest in this fine series—representing a male Nightjar at rest on the broad branch of a pine tree. There, no doubt, the pectination could very well be dispensed with. But the Nightjar is not so strictly a bird of the woodland as always to have pine trees, or trees of any kind, about its home. In many of its haunts stems of gorse-bushes, and even stalks of heather, form the customary roost, and on some of these it is difficult to see how the bird could possibly sit lengthwise without the lateral pectinations to give it some kind of grasp. Observations might well be made on the habits of Nightjars in captivity to settle this question, which has been under discussion since the days of Gilbert White.

C. B. M.

IRISH SOCIETIES.

BELFAST NATURALISTS' FIELD CLUB.

JULY 1.—EXCURSION TO BARON'S COURT.—A party of thirty-eight members and friends travelled by the 7.30 a.m. train to Newtownstewart. Newtownstewart was reached at 9.35 o'clock, and after a brief interval the party set off on cars for their destination.

Baron's Court—including the house and demesne of 5,000 acres—is charmingly situated in a narrow valley about two miles south-west of Newtownstewart. Within the demesne the lowest ground in the line of the valley bottom is occupied by a chain of three long narrow lakelets. The modern house, dating from the latter part of the eighteenth century, stands on a terrace on the eastern side of the middle lake, known as Lough Fanny. On the west side the woods and pastures of the park slope upward towards the bare moorland of Mullagheroy Hill (805 feet); on the east they stretch up along the steeper slopes of Bessy Bell, whose heath-clad summit reaches an elevation of 1,387 feet. It is on the Bessy Bell side that the modern deerpark is maintained. The view northward from the castle embraces the whole of Lough Catherine, the largest of the three loughlets. The surrounding hills are mainly composed of metamorphic schists, gneisses, and quartzites. Sands, gravels, boulder clays, and drifts of Glacial and post-Glacial origin fill the valleys and clothe the hill flanks. Huge accumulations of this kind stretch across the mouth of the Baron's Court valley, between the demesne and the town of Newtownstewart.

The gardener and forester conducted separate groups to various points and places of interest, which did much to enhance the value of the time spent in the grounds. Under their guidance, the members moved about from place to place, and examined almost everything of historical, antiquarian, and natural history interest. Of course it is needless to say that the very extensive gardens, greenhouses, and pleasure-grounds came in for a large share of attention, but the old castles and cromlechs had their admirers too. By means of boats some dredging

was done in the lakes. On the island in the centre of Lough Catherine there is a considerable heronry, and several young Herons were seen flying about. It may be noted that thirty-nine species of birds were observed during the day, all of them being common species. On an elevation in the woods, on the east side of the lake, stand the extensive ruins of an old castle dating back to pre-Plantation days, now the ivy-clad home of owls and Jackdaws. In a corner of it were the remains of a Wild Duck's nest, where a brood had been successfully hatched a few weeks ago. Baron's Court is one of the two recorded breeding places of the Redstart in Ireland, but the forester, who knows the bird and saw the nests for two years in succession, said that it had not been seen there for the past twelve years.

About three o'clock the members began to assemble together again at the castle. The botanists had nothing specially new to report beyond what has already been listed from the locality by Miss M. C. Knowles in the *Irish Naturalist* for March, 1897. One member who collected lichens handed in a good list, and has still other species yet to be identified. Large collections of centipedes, millipedes, spiders, mites, and harvestmen, as well as insects of various sub-orders, were taken for examination. The four common species of woodlice were seen, but searchers were rewarded by the finding in the hothouses of *Trichoniscus roseus*, *Metoponorthus pruinosus*, *Cylisticus convexus*, and *Armadillidium nasatum*, none of these species having been previously noted from County Tyrone. Dry weather militated against a large list of Mollusca, but most of the local species, with the exception of *Helix hortensis*, were obtained. In the woods *Zonitoides excavatus*, *Acanthinula lamellata*, and *Acicula lineata* were the best finds, the last-named being a new record for Tyrone. The fresh-water species were not well represented, but *Planorbis crista* added another species to the county list. In the small pond in the bog garden a large species of *Sphærium*, doubtless imported, may prove interesting. The cars were mounted at 3.40, and the return drive to Newtown-stewart made. On arrival at the Abercorn Arms Hotel, tea was ready. A brief business meeting was held, the President (R. J. Welch) occupying the chair. Immediately after the members made their way on foot to the railway station.

The river in the vicinity of the station is very picturesque. It has long been known for its pearls, which are found in the Pearl Mussel, *Margaritina margaritifera*, but few pearls of value have, it was learned, been got this season. This was probably due to the ruthless destruction of the shells by the more ignorant pearl fishers. In view of this destruction, steps should be taken to preserve the younger shells, which cannot, in the nature of things, contain pearls of any value. The party having entrained at 5.40, reached Belfast at 8.10.

JULY 12-15.—THREE-DAY EXCURSION TO CAVAN DISTRICT.—Cavan was reached shortly after eleven o'clock, and here the party received accessions on the arrival of the Dublin and Limerick members. Immediately after arrival lunch was served in the headquarters, the Farnham Hotel, and on its conclusion brakes were in readiness to convey the

members to the cathedral of Kilmore. After a thorough inspection of the church and its precincts, the drive was continued to the demesne of Killykeen. In the tea-house on the shore of Lough Oughter afternoon tea was served, and the members scattered to indulge in their varied avocations. At 6.30 the return drive commenced. After dinner the members were conducted to the Gallows Hill, the rounded summit of which is capped with boulder-clay and almost devoid of vegetation. The country all around bears testimony to the moulding effects of an ice-age.

Starting from the hotel at nine o'clock on Thursday, the route lay northwards to Butler's Bridge, where was crossed the River Anna, the main feeder of the Cavan lakes from the east; and shortly afterwards a halt was called at Baker's Bridge, under the arches of which flows the River Erne, on this occasion practically little more than a dry river-bed. Here a short time was spent. Remounting the brakes, the drive was continued to the village of Milltown, from which all proceeded on foot to the ruins of the abbey church and round tower of Drumlane. Shortly before three o'clock the conductor's whistle sounded the time for departure.

One and a half hours were spent in Belturbet, some of the members visiting the Parish Church, whilst others explored the town or collected by the river's bank, and at five o'clock the return drive was commenced, the morning's route being rejoined at Drumlure. Skirting the shore of Annagh Lough, the ruins of the old church and abbey of Annagh were observed, and soon afterwards twenty minutes was allowed to enable the botanists to search the extensive bog of Drumsillagh. After dinner the customary business meeting was held, the President (R. J. Welch) in the chair.

Nine o'clock on Friday morning found all the members seated in the brakes awaiting the starting signal, and about half an hour later Farnham demesne was entered. Passing the front of Farnham House, the avenue led through old woods, which, by the tall, straight growth of the tree trunks, gave evidence of careful supervision during growth. On reaching the southern end of Farnham Lake, all dismounted, and the botanists set out to explore the recesses of Derrygid Wood and the margins of the several lakes situated in the demesne. The gardens claimed the attention of some, and the many scenic vistas throughout the demesne gave opportunities to artists and photographers to secure mementoes of a pleasant day. The party returned to Belfast by the 4.55 train.

The following is a brief *resumé* of the best finds of the botanists:—*Neckera pumila*, a moss rare in the North of Ireland, and previously unrecorded from County Cavan, was found growing on a large sycamore at Kilmore Cathedral, where also the Rough Chervil and the hepatic *Lunularia cruciata* were observed. At Killykeen were seen *Juncus glaucus* (a rush common only on limestone), *Carex acuta*, and the moss *Barbula curvirostre*. In Derrywinny Bog, near Killykeen, were noted *Drosera anglica* and *Rhynchospora alba*, whilst here the Purple Loosetrife, *Lysimachia*, and the Valerian, &c., were very poor and starved owing to drought.

On Baker's Bridge *Ceterach officinarum* was seen. At Drumlane were noted *Inula Helenium*, *Sium angustifolium*, *Sambucus Ebulus*, *Chrysanthemum Parthenium* on the walls; and in the lake a curious alga floating like tiny green balls in the water. In Drumsillagh bog were noted *Utricularia sp.* and *Rhynchospora alba*. In the Farnham woods were *Euonymus europæus*, *Carex Pseudo-cyperus*, and the rare moss *Neckera pumila* was found on several trees. *Osmunda regalis* was observed in more than one locality. The ornithologists reported having observed sixty-seven species of birds, among which may be mentioned the Garden Warbler and a flock of Goldfinches. Nearly every one of the numerous lakes under observation was occupied by one or more pairs of Great Crested Grebes, in some cases accompanied by their broods, as were also the Mute Swans. A striking zoological feature of the district was the abundance of dragon flies of several species, and also the presence, often noted, of that large and beautiful butterfly, the Silver-washed Fritillary, an insect not well known in our home counties. Among the crustaceans the following were obtained:—The amphipod *Gammarus locusta*, and the isopod *Asellus aquaticus*, both of these being found commonly in the lakes and streams; whilst of the terrestrial isopods (woodlice) eight species were taken, viz.—*Trichoniscus pusillus*, *Philoscia muscorum*, *Oniscus asellus*, and *Porcellio scaber* previously recorded from the county, with *Trichoniscus roseus*, *T. pygmaeus*, *Porcellio pictus*, and *Metoponorthus pruinosis*, which had not hitherto been observed in County Cavan. The native woods of Cavan provide many sanctuaries for the old woodland fauna, so often scarce elsewhere, and this is specially true of the land-mollusca, which here find the shade and moisture so essential to their existence. *Hyalinia nitidula* was in great profusion under beeches in Derrygid Wood, as also *Clausilia laminata*, which was noted everywhere under old logs, branches, and leaves, and not confined to beeches, as so often stated. *Helix arbustorum* was abundant among nettles in one old graveyard, this being a new county record, and was found here in company with *Succinea putris*. The lakes and waterways yielded many fluviatile species. *Planorbis carinatus* and *P. vortex* being common, whilst dredgings at Killykeen and Farnham lakes gave *Valvata piscinalis* in quantity. *Anodonta cygnea* was noted in Lough Oughter and Farnham Lake, and in the River Erne, at Belturbet. Fresh-water sponges were found at Killykeen, and in great profusion at Baker's Bridge.

NOTES.

BOTANY.

New Locality for *Adiantum Capillus-Veneris*.

In a walk on July 1st, from Lisdoonvarna, Co. Clare, to Ardrahan, Co. Galway, crossing Burren into the limestone plain of Galway, I found in the parish of Killinny, about four miles from Gort, a luxuriant plant of *Adiantum Capillus-Veneris*. According to *Irish Topographical Botany*, this fern being found in S.E. Galway is a new record.

M. E. PRESCOTT-DECIE.

County Dublin Plants.

On June 28th, while flower hunting on Kippure Mountain, we came on about a dozen or even more plants of *Vaccinium Oxycoccus* growing high up near the top of the bog, on the north side of the mountain. As near as I can gather, we must have been about 1,700 feet up. Seeing by Mr. Colgan's book that the flower had not been found there before, I wrote and told him of our find, and he suggested I should write to the *Irish Naturalist*. Again, on June 30th, we found the plant growing on Seefingan Mountain, almost at the summit, on the northern side. There were fewer plants there than on Kippure. I had no aneroid with me on those two days, so the heights are not certain, but I have since got one and have been very nearly in the same places. Also in the spring I found *Helleborus foetidus*, growing along a hedge, at right angles to the main north road, about one mile south of Julianstown. It looked quite wild there, and was well established all along the hedge.

J. O'CALLAGHAN.

Swords, Co. Dublin.

ZOOLOGY.

Caricea means in Co. Donegal.

When dredging in lakes, land insects are not infrequently found on or among the contents of the dredge after they have been turned out on grass or heather where presumably the animals have been lying concealed until disturbed by the debris. In this way, in July, when dredging in Lough Aghvog, Co. Donegal, I obtained a fly which was identified at the British Museum as a female, specimen of *Caricea means* Gg.

HERBERT TREVELYAN.

Naval and Military Club,
London, W.

Local name for the Ghost Moth.

I was talking to a young man in Newry who takes some interest in natural history, and he described to me a moth which he said as a boy he often ran after and which was evidently the Ghost Moth (*Hepialus humuli*). He told me that where he then lived it was called the "Seven Sleepers." His home is in Co. Antrim, I think near Baliymena. He said that his father and everyone who spoke of the moth always called it by this name, so it is evidently a local name for this moth. I don't see any connection between the moth and sleep, so the name is probably a corruption of some older name, and it would be very interesting if this could be traced.

W. F. JOHNSON.

Poyntzpass.

NOTES ON THE FLORA OF INISHBOFIN.

BY R. LLOYD PRAEGER.

NOT long ago I had occasion to draw up comparative lists of the floras of Clare Island, Inishturk, and Inishbofin, for the purposes of the Phanerogamia section of the Clare Island report. The result was to show so remarkable a poverty in the Bofin flora, that I determined to pay a brief visit to the island to try to fill some of the more conspicuous gaps in the list of its plants. Accordingly three days (of which half a day was lost owing to heavy rain) were spent on the island in the last week of July of the present year, in company of A. W. Stelfox, T. J. Westropp, and Dr. G. Fogerty, who were also engaged on comparative work in connection with the Clare Island Survey.

The flora of Inishbofin was investigated, under a grant from the Royal Irish Academy, by A. G. More and R. M. Barrington, who visited the island in July, 1875, and devoted five days to the work—one of these days being spent on the adjoining island of Inishark. More's report,¹ issued during the following year by the Academy, contained a list of 303 plants. This number More did not consider unduly small, as he surmises that the combined flora of Bofin, Shark, and Turk may eventually be brought up to 350 species. But my suspicion that the Bofin flora was richer than this proves correct, as the two and a half days' work recently carried out has added 82 species, or 27 per cent., to the flora; while most of these were plants of wide distribution, as was to be expected, some of them were of considerable interest, such as *Arabis ciliata*, *Cochlearia gracelandica*, *Bartsia viscosa*, *Ophrys apifera*, *Lyco-podium inundatum*.

Inishbofin is nearly four square miles in area. It attains a less elevation than most of the western islands, none of

¹ Report on the Flora of Inish-Bofin, Galway, by A. G. More. *Proc. R. I. Academy* (2), vol. ii. (Science), 553-578, 1876.

its several rocky hills reaching 300 feet. These hills occupy three extensive lobes which form the northern part of the island, and also a fourth area on the southern shore. Between these northern and southern uplands, filling the centre of the island, is an extensive, swelling, smooth-surfaced tract of drift, highly tilled. The peaty covering of the hills has been almost entirely stripped for fuel, and the ground is a mere waste, relieved for the botanist only by the continued abundance of *Helianthemum guttatum*. Three of the five lakes of the island lie within this hilly area. Lough Fawna, in the centre, has beautifully clear water, with an immense profusion of *Littorella*, interspersed in the deeper portions with the rare *Isoetes echinospora*, and other plants. Lough Gowlanagower is also delightfully clear. Looking down through the water, one sees a lovely continuous sward, formed of about two parts of *Isoetes echinospora* to one part of *Lobelia Dortmanna*, every interstice between these plants being filled with *Elatine hexandra*, with here and there a cloudy mass of *Apium inundatum*. The surface is lined with the long straight leaves of *Sparganium affine*, and everywhere broken by the myriad nodding heads of the Water Lobelia. Lough Nagrooaun adjoining is, on the contrary, filled with algae; its shores are fringed with an exuberant growth of *Eriocaulon septangulare*. Lough Bofin, which lies at the head of one of the northern bays, is brackish, filled with algae and smelly mud, and fringed with a salt-marsh flora.

The cultivated drift area is almost as unpromising for the botanist as the naked hills, yielding indeed a more varied flora, but one in which common species and weed-plants hold the chief place. By far the richest ground is the valley which, continuing the depression which forms the harbour, runs eastward from it, past Church Lough. There is comparative shelter here, and Church Lough itself is surrounded with tall reeds and filled with water-lilies. On the southern side of this valley the hill descends in little rocky scarps, while on the northern side, opposite and beyond Church Lough, the influence of the sand-dunes makes itself felt, neutralizing the peatyness of the soil and

bringing in a large number of additional plants. The sand-dunes and shores which terminate the valley to the eastward also yield their quota, and the damp meadows which continue northward round the bay at Cloonamore form good ground, as does also the western termination of the valley, where it drops amid rocky scarps into the Inner Harbour.

It was in the places just enumerated that the majority of the additions to the flora were found. Bofin contains nowhere any of the patches of scrub such as occur on Clare Island and on Turk, but the rocky scarps facing north take the place of these; here grow the only trees on the island—a few bushes of Poplar and Rowan a couple of feet in height—and also the representatives of the woodland flora, and other shade plants, to which were now added *Ranunculus Ficaria*, *Cardamine flexuosa*, *Fragaria vesca*, *Lysimachia nemorum*, *Luzula maxima*, *Hymenophyllum unilaterale*. The sheltered grounds about Church Lake yielded their quota of additions to the flora, including *Caltha palustris*, *Oenanthe crocata*, *Veronica scutellata*, *Bartsia viscosa*, *Habenaria chloroleuca*, *Sparganium ramosum*, *Scirpus lacustris*. Where the influence of the sand made itself felt on the slopes north of this lake, making a soil light and slightly calcareous, the new plants included *Arabis ciliata*, *Trifolium medium*, *T. procumbens*, *Vicia hirsuta*, *Æthusa Cynapium*, *Crepis virens*, *Convolvulus arvensis*, *Ophrys apifera*, *Habenaria viridis*, *Ophioglossum vulgatum*, and a dry-built wall near by yielded *Ceterach officinarum*. The sands below these banks added *Antennaria dioica*, *Eryngium maritimum*, *Beta maritima*, and *Polygonum Raii* to the flora. The shores of the brackish Lough Bofin supplied *Bidens tripartita*, *Atriplex hastata*, *Ruppia rostellata*, *Scirpus maritimus*; and further additions to the halophile section were supplied by the shores of Bofin Harbour, in the shape of *Cochlearia officinalis*, *Sagina maritima*, *Juncus maritimus*, *Triglochin maritimum*, *Glyceria maritima*. The waysides at that place, which forms the commercial centre of the island, yielded some additional introduced plants, such as *Malva rotundifolia*, *Inula Helenium*, *Matricaria discoidea*. The northern

portions of the island were less productive of additions; the upland lakes appear to have been well searched by my predecessors; but a nice bit of old flat bog, fortunately almost undrainable, and consequently not yet destroyed, gave *Drosera anglica*, *Eriophorum vaginatum*, and the rare *Lycopodium inundatum*; while another marsh, lying at the head of Bunnamullen Bay, added *Utricularia intermedia*, *Carex limosa*, and *C. dioica* to the list. The remainder of the additional species came from various situations, in ones and twos.

I shall now list the additions to the flora of Bofin which came under my notice, adding a few notes on plants previously observed. Species added to the flora are printed in heavy type.

Ranunculus Ficaria, L.—East of the harbour. Found by digging for its roots.

Caltha palustris, L.—Near Church Lough.

‡ *Fumaria confusa*, Jord.—Type and var. *hibernica*, Pugsley.

Arabis ciliata, R.Br.—Sparingly on knolls N.E. of Church Lough.

Cardamine flexuosa, With.—East of the harbour.

Cochlearia officinalis, L.—In several places.

C. graenlandica, L.—Western shore, in its usual habitat—chinks of exposed rocks.

‡ *Brassica Rapa*, L. var. *Briggsii*, H. C. Wats.—Fields and banks, frequent. I assume that this is the *B. napus* of More's list.

Stellaria graminea, L.—East of the harbour.

S. uliginosa, Murr.—In several places.

Sagina maritima, Don.—In several places.

* **Lavatera arborea**, L.—Only in the vicinity of houses and fields.

‡ **Malva rotundifolia**, L.—Roadsides along the harbour.

* **Ulex europaeus**, L.—Along a fence at head of Bunnamullen Bay—no doubt planted.

Trifolium medium, Huds.—North of Church Lough.

T. procumbens, Sibth.—Dry banks north of Church Lough.

† **Vicia hirsuta**, Koch.—Rocky margins of fields north-east of Church Lough.

Lathyrus macrorrhizus, Wimm.—Rocky ground east of the harbour.

Rubus dumnoniensis, Bab.—“Practically identical with some of E. S. Marshall's Maam specimens.”—W. M. Rogers.

R. mollissimus, Rogers.—Near Church Lough, with the last.

R. dunensis, Rogers.—Near the harbour. A rare plant, previously recorded by me from Achill.

Fragaria vesca, L.—Rocks east of the harbour.

Pyrus Aucuparia, L.—A few small bushes on a rocky slope east of the harbour.

Sedum Rhodiola, DC.—North coast, from Doonnahineena eastward.
Drosera anglica, Huds.—Plentiful in marsh east of the head of Bunnamullen Bay.

Eryngium maritimum, L.—Sands opposite Inishlyon.

Apium nodiflorum, Reichb. fil.—Near the harbour.

Conopodium denudatum, Koch.—East of the harbour.

***Æthusa Cynapium**, L.—Sparingly in cultivated ground at Cloonamore.

Oenanthe crocata, L.—Filling a ditch near St. Coleman's Church.

Antennaria dioica, R. Br.—On sand-dunes opposite Inishlyon.

***Inula Helenium**, L.—With *Allium Babingtonii* at east end of Inner Harbour.

Bidens tripartita, L.—South end of Lough Bofin.

***Matricaria discoidea**, DC.—Now abundant around the harbour, and at Cloonamore.

***Tanacetum vulgare**, L.—Near St. Coleman's Church, planted or escaped.

Arctium Newbouldii, Ar. Benn.—Frequent, no doubt the *A. intermedium* of More's list.

Cnicus pratensis, Willd.—Abundant in many places.

Crepis virens, L.—Chiefly in sandy ground.

Campanula rotundifolia, L., var. *speciosa*, More.—I had looked forward to gathering this fine variety, which had apparently not been collected since found and described by More in 1875; but in the station indicated (a circumscribed area of sandy ground south of the harbour) no plant answering the description—stems 9-20 inches, leaves broader and more crowded, flowers 1 to 12, corolla one inch or more long—could be seen. The form which grew there was no more robust than I have seen in several other localities, the stems were about 9 inches, and flowers up to four on a stem, large, but not larger than they often are. I am inclined to think that var. *speciosa* was a robust form stimulated into luxuriant growth by a favourable season.

Vaccinium Myrtillus, L.—Rocks by Church Lough.

Lysimachia nemorum, L.—Rocks east of the harbour.

Myosotis repens, G. Don.—By Loughnagrooam and elsewhere.

***Symphytum officinale**, L.—Occasionally—an escape.

†**Convolvulus arvensis**, L.—In some abundance in fields and on banks about the harbour, Church L., and Cloonamore.

***Veronica Tournefortii**, C. Gmel.—Cloonamore.

V. serpyllifolia, L.—In several places.

V. scutellata, L.—By Church Lough and elsewhere.

Bartsia viscosa, L.—Sparingly on the south and west sides of Church Lough, and behind Cloonamore. The credit for this interesting addition to the flora belongs to A. W. Stelfox, who discovered the first colony on the south bank of Church Lough. The plant grows on Bofin in its accustomed habitat, and among native species; its occurrence here, coupled with its recent discovery in Connemara (*I.N.*, xviii., p. 253), disposes, to my mind, of any doubt as to its being native throughout its Irish range—from Cork to Donegal.

- Utricularia intermedia*, Hayne.—Marsh at head of Bunnamullen Bay.
- Thymus Chamaedrys*, Fries.—In several places.
- Stachys sylvatica*, L.—Rocks and edges of fields north of Church Lough.
- †*Lamium intermedium*, Fr.— } Both seen in several places.
 †*L. hybridum*, Vill.— }
- Beta maritima*, L.—Sparingly in several places on sandy and gravelly shores on the south and east shores.
- Atriplex hastata*, L.—On shores occasionally.
- Polygonum Rati*, Bab.—Luxuriant on sandy shores in the east.
- †*Rumex conglomeratus*, Murr.—One fine plant on a rock by the Inner Harbour.
- Euphorbia Peplus*, L.—Local on stony shores, roadsides, and fields about the harbour and Cloonamore.
- Salix cinerea*, L.—In several places, much eaten down.
- **S. pentandra*, L.—Here and there, but no doubt planted.
- Orchis incarnata*, L.—Behind Cloonamore.
- Ophrys apifera*, Huds.—Sparingly on dry bluffs S.E. of Church Lough, above the sand-dunes. An unexpected addition to the flora.
- Habenaria viridis*, R. Br.—South of Cloonamore.
- H. chloroleuca*, Ridley.—Near Church Lough.
- Juncus maritimus*, Lamk.—South shore of the Inner Harbour.
- Scirpus pauciflorus*, Lightf.—Near Church Lough.
- Sparganium ramosum*, Huds.—Frequent in suitable stations.
- Triglochin maritimum*, L.—West end of the harbour.
- Ruppia rostellata*, Koch.—Lough Bofin, abundant in some parts.
- Luzula maxima*, DC.—On a rock over the south side of Church Lough.
- L. campestris*, DC.—Near Church Lough.
- S. lacustris*, L.—Abundant in Church Lough.
- S. maritimus*, L.—Occasionally round Lough Bofin.
- Carex dioica*, L.—Head of Bunnamullen Bay.
- C. vulpina*, L.—Frequent in marshy places.
- C. ovalis*, Good.—In several places.
- C. vulgaris*, Fr.—Frequent.
- C. limosa*, L.—Marsh at head of Bunnamullen Bay.
- Eriophorum vaginatum*, L.—Marsh west of head of Bunnamullen Bay.
- Catabrosa aquatica*, Beauv.—Mouth of stream out of Church Lough, type and var. *littoralis*, Parnell.
- Glyceria maritima*, M. and K.—Shores in the south and east.
- Hymenophyllum unilaterale*, Bory.—On rock on south shore of Church Lough, and again a little further westward.
- Ceterach officinarum*, Willd.—A few plants on a dry-built wall by the roadside near Church Lake—an unexpected find, made by A. W. Stelfox.
- Ophioglossum vulgatum*, L.—Slopes north of Church Lough.
- Lycopodium inundatum*, L.—A fine colony of this rare plant in the middle of a flat bog between the head of Bunnamullen Bay and the top of the hill (288 feet) lying W.S.W. of it; also a few plants a little further to the westward.
- Selaginella selaginoides* Gray.—Sparingly in the north-west.

In addition to these unrecorded species, a number of plants for which a single station only was found by More and Barrington were seen in other places. It is not worth giving the additional stations in detail, but in the following list the numbers 1, 2, 3 signify the number of stations other than those given in More's report in which the plants were observed; where species proved to be of frequent or common occurrence, the letter f or c is added.

‡ <i>Fumaria pallidiflora</i> , 2.	<i>Polygonum amphibium</i> , f.
† <i>Senebiera Coronopus</i> , f.	<i>Empetrum nigrum</i> , 4.
<i>Sagina subulata</i> , 2.	* <i>Euphorbia Helioscopia</i> , c.
<i>S. nodosa</i> , 1.	<i>Myrica Gale</i> , 1.
<i>Spergularia rupestris</i> , f.	<i>Orchis maculata</i> , 1.
<i>S. salina</i> , 1.	* <i>Allium Babingtonii</i> , 2.
<i>Hypericum Androsaemum</i> , 3.	<i>Narthecium ossifragum</i> , f.
<i>Geranium molle</i> , f.	<i>Sparganium affine</i> , 3.
<i>Prunus spinosa</i> , 1.	<i>Juncus Gerardi</i> , f.
<i>Rosa canina</i> , 2.	<i>Triglochin palustre</i> , f.
<i>Crithmum maritimum</i> , f.	<i>Potamogeton natans</i> , f.
<i>Heracleum Sphondylium</i> , c.	<i>P. pusillus</i> , 1.
<i>Hieracium Pilosella</i> , f.	<i>Zostera marina</i> , 1.
<i>Aster Tripolium</i> , 1.	<i>Schaenus nigricans</i> , 2.
<i>Pulicaria dysenterica</i> , 3.	<i>Rhynchospora alba</i> , 2.
<i>Menyanthes trifoliata</i> , f.	<i>Eleocharis palustris</i> , c.
† <i>Veronica agrestis</i> , c.	<i>Carex extensa</i> , f.
<i>Pedicularis palustris</i> , 1.	<i>C. distans</i> , f.
<i>Scrophularia aquatica</i> , 1.	<i>Calamagrostis Epigejos</i> , 1.
<i>Scutellaria minor</i> , 2.	<i>Koeleria cristata</i> , f.
<i>Utricularia minor</i> , 1.	<i>Glyceria plicata</i> , 2.
<i>Primula vulgaris</i> , f.	<i>Lastrea aemula</i> , 4.

One species in the above list deserves particular mention—namely *Calamagrostis Epigejos*. This was recorded in More's list from one station, namely "sparingly on rocky banks at east end of the inner harbour." I refound it there—a single clump of about a square yard, bearing a single flowering stem. In view of this plant's rarity here, and elsewhere in Ireland—it is on record from Clare and Derry only—an additional station on Bofin was very welcome. This was furnished by an isolated rocky knoll in the fields behind the north end of Cloonamore Bay; here the plant was in profusion, and flowering abundantly.

Another record of More's report which I was glad to have verified was that of *Rubus thyrsoides*, a rare bramble of which the only Irish specimens known to Rev. W. Moyle Rogers (who kindly named the brambles I collected in Bofin) were from Co. Kerry.

A few plants listed in More's report were not seen by me. These are 11 in number. There is no reason to think that any of them may not be on the island still; but it may be remarked that *Avena fatua* and *Lolium temulentum* are often only fleeting casuals; also it would appear that *Chrysanthemum segetum* must now be rare, since so conspicuous a plant was not seen.

Potentilla reptans.	‡ <i>Avena fatua</i> .
Rubus carpinifolius.	Festuca duriuscula.
R. villicaulis.	F. elatior.
Callitriche verna.	F. pratensis.
Senecio sylvaticus.	‡ <i>Lolium temulentum</i> . ¹
Chrysanthemum segetum.	

Strengthened by the additions listed in the preceding pages, the flora of Inishbofin can now take its place among the well-known floras of the western islands, and though I have no doubt that additional species still await discovery, it is now possible to institute an instructive comparison between the vegetation of Inishbofin, Inishturk, and Clare Island. This I hope to do in my paper on the Clare Island flora, to be published in a few months.

National Library, Dublin.

¹ For *Brassica Napus* and *Arctium intermedium* of More's list see under *B. Rapa* var. *Briggsii* and *Arctium Newbouldii*, *supra*, pp. 108, 109.

SOME NEW IRISH SPIDERS.

BY D. R. PACK-BERESFORD, B.A., D.L., M.R.I.A.

SINCE the publication in March, 1909, of my supplementary list of the spiders of Ireland,¹ sixteen species have been added to the list. Two of these, viz., *Ero Cambridgei* (Kulcz.) and *Tibellus maritimus* (Menge) have been up to now confounded with, and recorded as, *Ero furcata* (Vill.) and *Tibellus oblongus* (Walck). I found I had specimens of both the newly distinguished species in my own collection, and by the kindness of Dr. R. F. Scharff I have been allowed to examine the specimens preserved in the Museum in Dublin, with the results recorded below.

I have to thank Dr. A. R. Jackson for the great help he has given me in determining many of the species now recorded, and also Mr. R. Welch, Mr. J. N. Halbert, and Mr. R. J. Pack-Beresford and Miss M. Browne-Clayton for collections sent me. Several of the species here noted were taken by Mr. H. Wallis Kew in Co. Cork and Co. Kerry, and have been recorded by him.²

***Loecranum domesticum* (Wid.).**

L. rupicola (Walck.). *Clubiona domestica* (Wid.) Bl. Spid. G.B. & I.
LEINSTER.

A single female was taken on the Howth cliffs in 1909 by Mr. J. N. Halbert, and was kindly identified for me by Dr. A. R. Jackson. On searching the same locality again in company with Mr. Halbert we found several immature specimens in October, 1910.

In Great Britain this spider is described by Mr. Cambridge as being very local, and has been taken only in Gloucestershire, Wiltshire, and Dorset.

On the Continent it is recorded from six or seven places in France, and is said by Mr. Simon to be "assez rare." It is also found in Hungary.

***Tibellus oblongus* (Walck.).**

T. propinquus, Simon, Ar. de France. *T. parallelus*, Kulcz., Ar. Hung.
Philodromus oblongus, Bl. Spid. G.B. & I. (probably).

CONNAUGHT. LEINSTER. ULSTER.

Dr. A. R. Jackson having lately pointed out that we had two species of *Tibellus* in this part of the world, which had up to now been

¹ *Proc. R. I. Acad.*, vol. xxvii., B., pp. 87-118.

² *Ir. Nat.*, vol. xix., pp. 64-73.

classified as a single species, I went through all the specimens I have in my collection and was also permitted by Dr. Scharff to examine all those in the Museum. As a result I find that both species were present. This species has been taken at Woodford, Co. Galway (R. L. Praeger, July, 1908), Portmarnock, North Bull, and Terenure, Co. Dublin; and Bundoran and Glenveigh, Co. Donegal (R. Welch, July, 1910).

There are also in the Museum collection several immature specimens from various localities, which it is impossible to refer definitely to either species.

Tibellus maritimus (Menge)

T. oblongus, Sim.—Ar. de France. *T. oblongus*, Kulcz.—Ar. Hung.

LEINSTER. CONNAUGHT.

This species has been taken at Fenagh, Co. Carlow; Tullamore, King's Co.; and Mote Park, Co. Roscommon.

The nomenclature of these two species as may be noted is decidedly inappropriate, for whereas *maritimus* has been taken only in inland localities, nearly all the specimens of *T. oblongus* are from places on or near the coast.

Hahnia nava (Bl.).

ULSTER. LEINSTER.

A single female of this species was taken at Ballyconnell, Co. Cavan, in April–May, 1910, by my brother, Mr. R. J. Pack Beresford, and two adult pairs were taken on Ireland's Eye in October, 1910, by Miss M. Browne-Clayton. It ranges all over Great Britain from Dorset to Edinburgh, while on the Continent it has been taken in Sweden, Germany, Austria, Hungary, France and Corsica.

Ero Cambridgei, Kulcz.

Theridion variegatum, Bl. Spid. G.B.I.? *Ero furcata*, (Vill.) in part.
LEINSTER.

Professor Kulczynski has also discovered that we have had two species of *Ero* in our collections, both of which have been included in the species *Ero furcata*, Vill., and he has described and named one of them as above. I found that I had both in my collection taken at Fenagh, Co. Carlow. This species seems to me to resemble very closely the figures of *Theridion variegatum* given by Blackwall in his "Spiders of Great Britain and Ireland," and I therefore, give this name as a synonym tentatively, as of course without comparing the actual specimens described by Blackwall, it is impossible to speak with certainty as to their identity.

Professor Kulczynski has identified specimens from Dorset, England, as belonging to this species, and also from Cracow.

Ero fureata (Vill.).

ULSTER. MUNSTER. LEINSTER.

An examination of the spiders in the collection in the Dublin Museum, under this name, shows that two females were taken in Londonderry

in May, 1895, and an adult pair on Galtymore, Co. Tipperary in September, 1897. I have also taken them in fair numbers at Fenagh, Co. Carlow. The specimen recorded by Professor Carpenter from Clonbrock, Co. Galway, is not preserved in the Museum collection, so its identity cannot be determined, neither can that of the immature specimens to which he refers.

***Lophocarenum parallelum* (Bl.).**

LEINSTER.

A single female was taken at Moyglare, Co. Meath, by my brother R. J. Pack Beresford in 1909, and kindly identified for me by Dr. A. R. Jackson.

In England it is recorded from Bloxworth, Portland, and Weymouth in Dorset, by Mr. Cambridge, while in Scotland it has been taken in North Sunderland by Mr. J. E. Hull.

M. Simon says it is common in France, and is found all over Europe.

***Styloctetor penicillatus* (West.).**

LEINSTER. ULSTER.

I have taken a number of this species at Fenagh, Co. Carlow, and two females in Co. Antrim, near Kilrea.

In England it has been found in Dorset, Cheshire, Yorkshire, and Cumberland.

On the Continent of Europe it is recorded from France, Germany, Sweden (Simon), and Galicia (Kulcz).

***Walckenaera nodosa* (Camb.).**

W. jucundissima, Camb.

ULSTER.

A single female was taken by Mr. R. Welch on 12th October, 1909, on the banks of the Ulster Canal, near Monaghan.

In England this spider occurs in Dorset and Northumberland only.

In Europe, M. Simon records it from only one locality in the Department of Aisne in Northern France.

***Trichoniscus saxicolus* (Camb.).**

Walckenaera saxicola, Camb. *Tigelinus saxicolus*, Simon.

LEINSTER.

I took a number of females both mature and immature of this species on the cliffs of the Broad Strand, Howth, in October, 1910, but though I searched the same spot again several times in June and July, 1911, I failed to find more.

In Great Britain it has been taken only in Dorset, while on the Continent it is recorded by M. Simon from France, Switzerland, Bavaria, Nassau, and Silesia, and by Professor Kulczynski from Hungary.

It is evidently a southern species.

***Erigone Welchii*. Jackson.**

ULSTER.

During the summer of 1910, Mr. R. Welch sent me a tube of spiders collected by him at Bunbeg, Co. Donegal, on the Carrickfin peninsula;

Amongst them were three males and three females of a species of *Erigone* which were unknown to me, and which on further investigation by Dr. A. R. Jackson proved to be new to science, and were named by him *Erigone Welchii* in honour of their discovery. Dr. Jackson described and figured this spider in the *Irish Naturalist*, pp. 28-31 of the present volume.

***Erigone capra*, Simon.**

ULSTER.

Several males and one female of this very rare species were taken on the banks of the Ulster Canal, near Monaghan, by Mr. R. Welch in October, 1909.

It has not yet been met with in Great Britain, and is recorded from one locality in France (Simon).

***Tmeticus simplex*, F. Canib.**

ULSTER.

A single male of this species was taken by Mr. R. Welch in the gardens of the Belfast Drainage Works, on Belfast Lough, in October, 1910.

Numerous examples of it were taken in a cellar at Cannoch in Staffordshire by its describer, Mr. F. O. P. Cambridge, but it does not seem to have been met with elsewhere.

***Tmeticus rivalis*, Camb.**

MUNSTER.

A single male was taken by Mr. H. Wallis Kew on the summit of Mangerton, Co. Kerry, in August, 1909, and recorded in the *Irish Naturalist* of April, 1910.

In England it was first taken in Staffordshire by Dr. A. R. Jackson, in 1902, and subsequently by Mr. Falconer at Hexham, while it has not yet been found on the Continent.

***Hilaira montigena* (C. L. Koch).**

MUNSTER.

Two females and a male of this species were taken on the summit of Mangerton, Co. Kerry (2,750 feet), in August, 1909, by Mr. H. Wallis Kew, and recorded by him in the *Irish Naturalist*, April, 1910.

In Great Britain this species was first recorded from near Glasgow, and was subsequently taken on the summit of Helvellyn, and in Lanarkshire, and in Perthshire at an elevation of 3,500 feet, by Mr. W. Evans.

On the Continent it has been taken near Zermatt, in North Italy, and the Tyrol (Simon).

***Bathyphantes setiger*, F. Camb.**

B. spretus (O. P. Camb.), 1906.

LEINSTER.

On various occasions during the past year or two I have taken female spiders in a bog near Fenagh, Co. Carlow, which I believed to be *Bathyphantes parvulus*. During the summer of 1910, however, I took one

of these females in company with an adult male. On sending the pair to Dr. Jackson, he at once recognised them as belonging to the above rare species.

It was taken originally in Newtown Moss, Penrith, by Mr. Frederick Cambridge, in April, 1893, the only locality from which it has since been recorded being Watton in Norfolk, where a single specimen was taken by Mr. Freston, and described by the Rev. O. P. Cambridge under the name of *B. spretus*. He has, however, since come to the conclusion that it belongs to this species.

It has not yet been found on the Continent of Europe.

***Hyptiotes paradoxus* (C. L. Koch).**

MUNSTER.

Mr. H. Wallis Kew first discovered this spider in Ireland, in August, 1909, at Glengarriff, Co. Cork, where he took fifteen specimens, all adult females. He describes his most interesting capture in a delightful paper in the *Irish Naturalist* for April, 1910.

In England it was first noted in 1864 in Cumberland, and was again taken in 1894-5 by the Rev. O. Pickard-Cambridge and Mr. Warburton in the New Forest.

It is recorded from a few localities in France (Simon), and Hungary (Kulcz).

***Euophrys petrensis* (C. L. Koch).**

CONNAUGHT. ULSTER.

I took a number of immature specimens of this tiny Attid at Carrowroe, near Costello, Co. Galway, in July, 1909, and some mature specimens under stones on Fair Head, Co. Antrim, in August of the same year.

In England it has been found only in Dorset, Hampshire, and Cumberland. M. Simon records it from France, Sweden, and Germany.

Fenagh House, Bagenalstown.

“IGNIS FATUUS” VERSUS “LUMINOUS OWLS.”

BY PASTOR C. LINDNER.

On my way to Mr. R. J. Ussher, with whom I have had a very delightful ornithological excursion, I had heard in London about “Luminous Owls,” and when I was asked for my opinion I said that I did not believe in the existence of luminous birds. Before I read the notes by Mr. Moffat in the *Irish Naturalist*, (*supra* p. 127), I remarked: I suppose that those puzzling luminous owls must be a mistake, and

that the described appearance is in fact a "Willy-the Wisp." I was pleased on reading the notes of Mr. Moffat to find that they agree, not only with my opinion, but with an observation I have made which may be of interest.

I remember very well that nine or ten years ago, late one evening in autumn, in my own neighbourhood (Middle Germany) I was walking on a road which runs about 50 metres above the level of a meadow-valley traversed by a small stream. It was a calm and very dark evening, and no star was to be seen. Suddenly I perceived a light about 600 or 800 metres before me; it was on the ground of the meadow in a little boggy place not far from a small village. I did not at first attend to it, because I thought that someone with a lamp was coming to the other village, which I had just left. After a few minutes I looked at the light occasionally and wondered it did not approach me. Still I did not suspect an unusual appearance, when the light (which had been moving a little, as if somebody was walking with a lamp) quickly rose, almost perpendicularly but a little zig-zag, to a remarkable height, and then disappeared suddenly. I was much astonished, because I had never before seen such an appearance, and I paused, feeling sure that I had seen a "Willy-the-Wisp" and hoping to see it once more. In fact after a short time I did perceive, nearly in the same locality from which the first light arose, a luminous fog shining faintly. A little later there was a tremulous movement in the fog. All at once this faintly shining fog was transformed into a small luminous nucleus, of the size of a lamp-light. This extraordinary light was sometimes standing, sometimes moving, and at last it rose and disappeared in the manner before described. I observed it going out and reappearing for some time, perhaps twenty minutes.

In reference to this observation I may add that "Willy-the Wisp" is seen very seldom in my district; but, as for the appearance I have described, nobody could believe for a moment that it was caused by a bird.

NOTES ON THE OVENS CAVES, CO. CORK.

BY ROBERT W. EVANS.

These caves are situated about eight miles from Cork City alongside the old coach road to Macroom, and about a mile from Kilumney railway station. The earliest reference to them is to be found in Smith's "*History of Cork*," which states that "in the Parish of the Ovens is a most remarkable cave beneath a stupendous limestone arch twelve feet high at the entrance, but declines to less than six. . . . The passage is on the W. side, but in about twenty yards the cave winds to the S. and S.E. Another way leads due W. to a well about 80 yards from the entrance. There are many other passages, the whole forming a perfect labyrinth under ground. . . . The country people say that the cave runs to Gillabbey near Cork."

This description is substantially an accurate account of the geography of the cave; but the "stupendous arch" does not now exist, and the height of the main entrance is about the same measurement as that given in Lewis' "*Topographical Dictionary*" 1837, viz., three feet. The statement that the cave runs to Gillabbey near Cork is, of course, one of those grotesque fictions which the peasantry living in the neighbourhood of caverns relate for the benefit of credulous visitors.

From the scenic point of view the Ovens are very uninteresting; the stalactitic pendants where they occur are of the most insignificant type, such as might be seen under an ordinary limestone bridge, while the stalagmite is of a dirty brown colour, and exhibits but little variety of form. The larger galleries are, however, important as types of cave formation almost entirely due (the writer submits) to the erosive action of subterranean streams.

Two distinct classes of galleries occur.

I. Irregular low-roofed fissures which seem to have been formed along the secondary joints; these contain floors of

stalagmite and brecciated earth, along which progress is extremely tedious, and has to be undertaken on hands and knees.

II. On a slightly lower level than I. occur tunnels averaging about eight feet in height, and wide enough in places for a large number of persons to walk abreast. As this second type contains practically no stalactites and has floors of gravel, here and there mixed with a thin coating of silt, it seems very improbable that corrosive action had much to do with its formation. The rock walls are grooved in a very regular fashion. These large galleries contain water during the winter months.

There are several small openings, some of which have been brought to light during recent quarrying operations. All the galleries running from the main openings are of type II. Type I. occupies the inmost portions of the cave. Several galleries run under the highway, and the rumbling of vehicles can be heard quite distinctly. It is possible to enter at the main opening at the southern side of the road, and emerge (after a tortuous journey) at a "fox earth" 200 yards away, at the northern side.

The river Bride flows alongside the quarry, at a higher level than the cave floor. Along the river bank are some remarkable grooved rocks. It is doubtful, however, if the stream penetrates to the cave during flood times, as a talus intervenes between it and the cave mouths.

Neither the Ovens nor Cloyne caves (both of which have a stream flowing through them), contain deep narrow fissures which seem to be the product of chemical dissolution.

A large number of red sandstone boulders coated completely with carbonate of lime were met with in one place.

During the Penal days Mass was celebrated in the Ovens, and a stalagmite altar existed for this purpose, but the writer was informed that it was removed some years ago.

The writer was assisted in the most recent explorations by Messrs. F. Hornibrook and McSwiney of Cork.

FUNGI FROM CO. ANTRIM.

BY W. B. GROVE, M.A.

SINCE my previous short paper (*supra*, p. 142) was written, a packet of Fungi, collected in a fen at Portmore Lough, Co. Antrim, on June 25th, has been sent by Professor D. T. Gwynne-Vaughan, who accompanied the party on the Coast Excursion. The species were as follows:—

PYRENOAMYCETES.

Claviceps microcephala, Tul.—On caryopsides of Phragmites.

Hypotylon cohaerens, Fr.—Colin Glen, Belfast. On old bark of beech.

Scirrhia depauperata, Fekl.—On culms of Phragmites.

[In my previous list *Eutypa lata*, Tul. should read *E. leioplaca*, Cooke].

DISCOMYCETES.

Dasysecypha palearum, Mass.—On culms of Phragmites.

Dasysecypha albo-testacea, Mass.—On culms of Phragmites.

Mollisia arundinacea, Phill.—On culms of Phragmites.

Belonidium excelsius, Phill.—On culms of grass.

DEUTEROMYCETES.

Dendryphium comosum, Wallr.—On herbaceous stems.

Torula asperula, Sacc.—On herbaceous stems.

Birmingham.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Vernet Monkey, an East African Lion from H.M. the King, a Yellow Baboon and two Badgers from Mr. G. M. Jones, two Green Monkeys, a Civet Cat, and a Royal Python from Mr. C. E. Lane Poole, a Serval from Major H. J. Kelsall, five Bulgarian Ground Squirrels from Mr. P. Mahony, two Angora Rabbits from Mr. S. J. Rawson, a Chough from Mr. C. J. Carroll, eight Pigeons from Mr. G. Mitchell, and a Ringed Snake from Dr. R. F. Scharff. A young Mandrill, a Brown Capuchin Monkey, two Prevost's Squirrels, and an Indian Ratel have been bought.

The Lion given by the King is a full-grown male, with remarkably black mane, and fierce in behaviour. A litter of five Lion Cubs—the parents being Niger and Nigeria—were born on September 6th. A great loss has been sustained by the death of the White-handed Gibbon, which had lived in the Monkey-house for more than a year and delighted all visitors by its great agility.

BELFAST NATURALISTS' FIELD CLUB.

JULY 29.—EXCURSION TO ELLIS'S CUT, LOUGH NEAGH.—Twenty-seven members started from Belfast by the 1.50 train, and in little over half an hour arrived in Lurgan. Here brakes were in readiness to convey the party to Shan Port, and the members then walked along the shore to Ellis's Cut, this section of the lough margin, about a mile in length, including all that portion of County Down which impinges on Lough Neagh. The afternoon was bright and warm, and the time passed pleasantly as the members strolled along the now dry lake-shores and pursued their various avocations. The canal was crossed at the Ellis's Cut lock, and a walk of five minutes sufficed to bring the members to Leansmount, where the brakes were waiting, and the return journey to Lurgan was commenced. Tea was served in the Brownlow Arms Hotel, and afterwards the President (R. J. Welch) gave a *resumé* of the work which was being accomplished in the Natural History Survey of Clare Island. The 7.30 train conveyed the party from Lurgan, and from its windows the members had an opportunity of witnessing an unusually magnificent display of lightning, the flashes, which followed closely one after another, appearing to rise from the ground and disappear in the dense black cloud above. Belfast was reached shortly after eight o'clock. The country between Lurgan and Lough Neagh is covered with drumlins, and on the shores of the lake the geologists found numerous erratics of Scotch granite. The members of Committee present were pleased to see a much larger number of young lady botanists than usual present at this excursion, and the members of this section were fortunate in finding a number of our rarer plants. The following list includes some of the best botanical finds of the afternoon :—*Ranunculus Lingua*, *Oenanthe fistulosa*, *Sagittaria sagittifolia*, *Thalictrum flavum*, *Typha angustifolia*, *Lysimachia vulgaris*, and *Spiranthes Romanzoffiana*, the latter (one of our rarest Irish plants) being new to the flora of County Down. In little hollows by the lake margin were quantities of a small spherical algae. Very few birds were noted, this being about the worst time of the year for ornithological observation. Owing to the low state of the lough collecting was easy, and shells abundant, though very few full grown; and it was noted that shells which normally live at the bottom of fairly deep water, were now feeding on surface plants, a fact already observed on previous excursions this year. Some fourteen species of fresh-water molluscs were taken, including *Sphærium lacustre* and *Pisidium amnicum*, the latter scarce shell being much more abundant than usual. Good collections of spiders, water-scorpions, plant-bugs, water-beetles, &c., were brought away for further examination. Many polyzoa and cladocera were collected, whilst among the Rotifera taken *Stephanoceros Eichornii*, *Meliceria ringens*, and *Limnias ccratophyllis* were identified, and these proved very plentiful.

AUGUST 12.—EXCURSION TO LOUGHGALL AND ARMAGH.—Some thirty members and friends travelled by the 9.30 train to Armagh. Upon arrival in the Primatial city the party were conducted to the Roman Catholic cathedral, and afterwards started for Loughgall. The drive proved of

much interest, the numerous rounded hills and neat farmhouses with their attendant orchards giving way toward Loughgall to great areas of grazing land. Opposite the entrance gates of the Manor House the party dismounted, and proceeded to the lake side. After an interval most of the party visited the gardens. A splendid yew alley formed an item of interest, some of the trees being reported to be over three hundred years old. At 2.30 the return drive to Armagh was commenced. Tea awaited the party at Loudan's Imperial Hotel, after which—Nevin H. Foster in the chair—a short business meeting was held. The Chairman referred to the recent formation of a junior section within the Club, and the election of Miss Patchell to membership concluded the meeting. At 4.15 the party set out on foot for the Palace, visiting on the way the ruins of the Franciscan abbey, built during the fifteenth century. An item of geological interest was here noted, the walls of the abbey being almost entirely built of Old Red Sandstone boulders, which had all the appearance of having been taken from some of the neighbouring masses of glacial drift. Upon arrival at the Palace the party were received by the Lord Primate and Mrs. Crozier. Subsequently the party returned to Armagh and entrained for Belfast.

The botanists reported several interesting plants, among which were *Carduus acanthoides*, a somewhat local thistle; *Eupatorium cannabinum*, *Lithospermum officinale*, and *Carex pendula* and *C. acuta*, two of the less common sedges. Two interesting species of shells were found at Loughgall, one of these—*Zonitoides nitidus*—being an addition to the fauna of County Armagh; the other—*Limnæa auricularia*—had not been recorded from the county except from Lough Neagh. In the garden at the same locality it was interesting to see *Hygromia rufescens* aestivating upon the trunks of the yew, apple, and other trees. Among the birds observed on the lake were a couple of pairs of Great Crested Grebes, one of which was accompanied by its brood of three almost full-grown chicks. The four common species of woodlice were observed in the district, as was also the rarer *Trichoniscus pygmaeus* and *Porcellio pictus*. In the Manor House gardens *T. roseus*, *P. dilatatus*, *Haplophthalmus Mengii*, and *Metoponorthus pruinus* were taken, a specimen of the last species being also captured under some slates lying in the railway yard at Armagh. *H. Mengii* and *M. pruinus* had not been found previously in County Armagh.

AUGUST 30.—EXCURSION TO KELLS AND CONNOR.—The party travelled by the 12.25 train to Kellswater station, and were met here by conveyances. On reaching the site of the ancient cathedral of Connor they were met by Rev. O. W. Clark, who pointed out the objects of interest to be seen here. Templemoyle, a monastery formerly known as St. Mary's of the Desert, was next visited. At Liminay, on Mr. James Black's farm, the owner had opened a fine souterrain for the inspection, and also entertained the party, providing some welcome light refreshments. A kistvaen and stone circle were then visited at Ballymarlow. Ballymena was reached in good time, and tea was served in Whiteside's hotel, at which a short business meeting was held. Belfast was reached in good time after an interesting and busy excursion.

GEOLOGICAL SECTION.—SEPTEMBER 2. EXCURSION TO HILLSPORT, ISLAND-MAGEE.—The party, numbering sixteen, left Belfast by the 2.15 train for Ballycarry station, and drove thence to Gobbins Brae. After descending to Hillsport, the railway company's path along the face of the cliffs was taken, and the variations in the nature of the successive basic lava flows, were noted. Fine zeolites were collected, including natrolite, chabazite, gmelinite, levyne and phillipsite.

The Chalk, Greensand and Lias were examined near Hillsport. No continuous sections are visible, but blocks of the various types are scattered along the base of the undercliff. The " Chloritic Sands " yielded *Echinocorys scutatus*, *Camerospongia fungiformis*, *Serpula filiformis*, *Rhynchonella robusta*, and spines of *Cidaris*. Ventriculites and fragments of *Inoceramus* were also plentiful in certain bands. Two outcrops of the Lower Lias occur. The fossils most frequently met with here are *Ammonites planorbis*, *Cardinia ovalis*, and *Astarte Gueuxii*.

Several caves in the Gobbins cliffs were observed, showing old sea floors at a considerable elevation above the highest tides of to-day.

NOTES.

BOTANY.

Spiranthes Romanzoffiana in Co. Down.

On July 29th, on the occasion of the Belfast Naturalists' Field Club's excursion to Ellis's Cut, when examining the shore of Lough Neagh, townland of Kilmore, Co. Down, I had the good fortune to see growing a few plants of the above, in fine form, and full bloom.

NATHANIEL CARROTHERS.

Belfast.

Irish Uredineae.

Mr. W. B. Grove would be much obliged if those Irish botanists who take an interest in the Uredineae would send him specimens of all the rarer species they collect, especially all that grow on grasses and sedges. Every specimen must be accompanied by the name of the host, the locality and the date. Address to the University, Botanical Department, Birmingham.

ZOOLOGY.

Nagara nana—A correction.

In my note on this woodlouse (page 156 *supra*) the insertion of a semicolon after the word " body " on line 25 renders the sentence somewhat obscure. It should read—Colour grey, with paler oblong spots on the body segments, forming a pale longitudinal line.

NEVIN H. FOSTER.

Hillsborough, Co. Down.

A variety of the Magpie Moth.

When driving home from Newry, as I reached the top of the long hill down to Poyntzpass, which is here called "Williamson's Hill," I saw a very yellow-looking Magpie Moth fluttering along the hedge. I at once jumped down and captured it. It proved to be a beautiful variety of this common moth (*Abraxas grossulariata*). The ground colour of the fore wings is pale buff, the yellow blotch at the base and the yellow line towards the hind margin are greatly enlarged, especially the latter, in the hind wings a yellow patch extends from the anal angle more than half-way across the wing, and the black spots are very small. It was captured on July 19th.

W. F. JOHNSON.

Poyntzpass.

The Money Cowry in Ireland and England.

The older generation of naturalists in Belfast, in the first half of the nineteenth century, often had *Cypraea moneta* sent to them from the coast near Bangor, Co. Down. These were supposed to have come from an old slave ship wrecked in the vicinity. Some years ago, this shell, with a small proportion of *C. annulata*, was very abundant on the Cumberland coast near the mouth of the Calder. As many as 600 specimens were collected in a few days by one conchologist. These shells came from the "Glendowra," wrecked in a fog near Seascale in 1873, when homeward bound from Manilla. Part of her cargo consisted of sixty tons of cowries, which would amount to about seventy million shells in all, so that even now, and for many years to come, there is a chance of this shell being found almost anywhere on the north-west coast of England.

R. WELCH.

Belfast.

Pelamys sarda in Irish Water.

Two specimens of this fish were taken on the 14th August in a pollack-net off Broad Strand, Courtmacsherry, Co. Cork. They measured respectively $23\frac{1}{2}$ and $25\frac{1}{4}$ inches, and weighed $4\frac{1}{2}$ and $5\frac{3}{4}$ lbs. Both were males, the smaller with milt running. The larger had swallowed a good-sized mackerel. This species is figured and described under the name given above by Day ("British and Irish Fishes"), and, as *Sarda pelamis*, by Smith, "Scandinavian Fishes," Ed. 2. It never grows much larger than the Courtmacsherry specimens, and, though not previously noticed on our coast, has been occasionally taken in English and Scots waters, and in Norway.

E. W. L. HOLT.

Fisheries Office, Dublin.

Scops Owl in Donegal.

On 24th July last I received a small owl from Ballyliffen, N. Donegal. It was in bad condition and the head was quite unrecognisable. From the markings I thought it was a Little Owl but on sending a wing to Mr. A. R. Nichols he identified it as a Scops Owl (*Scops giu*, Scopoli). This is, I believe, the first record of the species for Donegal.

D. C. CAMPBELL.

Londonderry.

REVIEWS.**A GUIDE TO THE CRUSTACEA.**

The Life of Crustacea. By W. T. CALMAN, D.Sc. Pp. xvi. + 289.
With 32 plates and 85 figures. London: Methuen and Co.
Price 6s.

Dr. Calman's admirable systematic work on the Crustacea is known to all zoologists, and the volume on the class which he contributed to Lankester's "Treatise of Zoology" was some time ago reviewed in our pages (vol. xviii., p. 133). The present handy book is more popular in style than that volume, but it is none the less scientific in treatment and contains much that is valuable to the earnest student, while it whets the zeal of the beginner in "Nature-study." Most of the chapters deal with the crabs and their allies in relation to their surroundings, and such titles as "Crustacea of the Deep Sea," "Crustacea as Parasites and Messmates," or "Crustacea in Relation to Man," indicate that Dr. Calman treats his subject from the bionomic standpoint which is, to a large extent, ignored in Lankester's great "Treatise." Yet our author realises that some morphological foundation is necessary for the profitable study of life-relations, and begins the book with chapters on "The Lobster as a Type of Crustacea," "The Classification of Crustacea," and "The Metamorphoses of Crustacea." In the chapter on classification, Dr. Calman enforces his now well-known scheme in which the old order Schizopoda is divided, the Euphausiacea being regarded as more nearly akin to the Decapoda than to Mysis and its allies.

The bionomic chapters, which make up most of the book, deal with the life of Crustacea in a manner at once suggestive and inspiring. Dr. Calman's extensive knowledge of structure renders his accounts of habit all the more valuable. He gives a concluding chapter on "Crustacea of the Past," in which it is gratifying to read that the lately described Oxyuropoda from the Kilkenny Devonian "has every appearance of being an Isopod." The beautifully reproduced photographs and the excellent line drawings by Miss G. M. Woodward deserve more than a passing word of praise.

G. H. C.

OUR FRESHWATER FISHES.

The Freshwater Fishes of the British Isles. By C. TATE REGAN, M.A.
London: Methuen and Co., Ltd., 1911. Price 6s.

It is a long time since Yarrell's and Day's "*Fishes of the British Islands*" were published, and they still are our standard works. Some years ago it was rumoured that Mr. Holt was preparing a new book on this subject. Meanwhile our wants have at any rate been satisfied to some extent by the issue of Mr. Regan's work on the *Freshwater Fishes of the British Islands*, and it is to be hoped that he may be induced to undertake the British marine fishes as a complement to the present volume.

Mr. Regan's book claims to be a popular account of the fishes of our lakes and rivers. It is meant for those who desire reliable information as to our freshwater fishes, their specific characters, geographical distribution and life history.

Although it is doubtful whether the average angler will be able to discriminate for example between the different kinds of Irish Char recognised as distinct species by Mr. Regan, while he will readily point out the distinguishing features between different kinds of Trout which are all clumped together as one species by the author, yet the book on the whole is what it claims to be. It is well illustrated, all the species being figured.

As might be expected, the Salmon and Trout are given a fair share of consideration. Although most fishermen would never hesitate for a moment as to their ability of distinguishing a Salmon from a Trout, it is surprising how few of them really know the difference between these species at all ages. Mr. Regan discusses this point very carefully, drawing attention to all the characters in which they differ, viz., the rays in the dorsal fin, the number of scales between the lateral lines, the adipose fin, and also the shape of the tail. It has been ascertained now that a Salmon rarely lives more than eight or nine years, or spawns more than three or four times. The age of the fish can be determined by a detailed study of its scales, new tissue being added to the latter in the form of a series of concentric ridges which somewhat resemble the rings of growth in the stem of a tree. When the Salmon repairs to fresh water, the scales cease to grow, their edges becoming worn and irregular. The fish thus has its life history clearly recorded on its own body, for those who are able to read it. Mr. Regan shows that it is not an absolute necessity for the Salmon to go to sea at all. It may even become mature in the parr stage, while female Salmon have been known to produce ripe spawn when little more than overgrown smolts.

Of particular interest to the angler is the vexed question whether the Salmon feeds in the river as it ascends from the sea. The practical fisherman settled the question at once by the remark, "Of course it does, otherwise it would not take the fly." All the same it can be regarded as certain that the Salmon does not feed in fresh water. From the time it enters the river its weight gradually decreases, and the stomach has been shown to be always empty.

As already alluded to, Mr. Regan recognises but a single species of Trout (*Salmo trutta*). The Irish Gillaroo, the Great Lake Trout, the Sea Trout, the Black-finned Trout and others are held to be mere varieties of the Common Trout.

On the other hand, while we were in the habit of distinguishing only two kinds of Irish Char, Mr. Regan now informs us that there are no less than six distinct species in Ireland. In addition there is the so-called "Whiting" of Lough Neagh, which is now extinct and which Mr. Regan (p. 110) believes to have been a Char.

Lough Neagh is also inhabited by another fish which is still common in the lake, namely the Pollan (*Coregonus pollan*). Mr. Regan adopts the name "Whitefish" for this and other species belonging to the genus *Coregonus*—a much better term than "Salmonoid" fishes hitherto used for this group. He separates the Irish Pollans on somewhat slender grounds (pp. 118-121) into three distinct species, viz., the Lough Neagh Pollan, the Lough Erne Pollan and the Shannon Pollan.

He comments (p. 112) on the point interesting to the angler that while American Whitefish are said to rise to the fly, the European species are seldom known to have done so, being consequently netted in all localities where they occur in sufficient numbers.

Many of the other fishes referred to by Mr. Regan are absent from Ireland, but there is one that hitherto has been believed not to inhabit Ireland, namely, the Dace (*Leuciscus leuciscus*), which, according to Mr. Holt (*Irish Naturalist*, vol. xx. p. 116) is found in the Blackwater and may possibly be a true native species.

A final chapter deals with the distribution in the British Islands of the fresh water fishes, and their origin. Mr. Regan quite agrees with previous writers on this subject that the presence in the British Islands of these fishes implies the former existence of a land connection between Great Britain and Ireland as well as with Continental Europe (p. 271). So far there is unanimity of opinion among naturalists. It is only with regard to the geological period during which the British and Irish fishes are supposed to have invaded these countries that the conclusions arrived at by different authors vary considerably. Mr. Regan maintains that it was only after the Glacial Epoch that the freshwater fishes commenced to invade our territory, while others believe that the fishes lived in Great Britain and Ireland before the Ice Age, and survived it in these countries.

Altogether Mr. Regan's work is a very attractive one, and can be safely recommended to all those who are anxious to acquaint themselves with the habits and distribution of the British and Irish freshwater fishes.

R. F. S.

A HIGH LEVEL DEPOSIT OF MARINE SHELLS IN CURRAUN ACHILL, COUNTY MAYO.

BY J. DE W. HINCH.

The occurrence of large quantities of marine shells above present high-water mark is often regarded as evidence that at some past time the sea stood at a higher level than at present—and with certain reservations the evidence may be regarded as sound. When we find a formation of water-worn pebbles and of marine shells, of the types present in the adjoining sea at the present day, stretching for considerable distances along the present coast-line and at the same general level above present high-water mark, we may regard the evidence as sufficient to warrant the theory that within recent time the sea has stood at the level of the raised beach. There are, however, cases in which the presence of sea-shells at considerable elevations does not necessarily prove that the sea has changed its level, and the explanation must be looked for in another direction. One most common case, especially along the eastern coast of Ireland, is the occurrence of shells in the Glacial drifts. These beds, occurring from sea-level to over 1,200 feet in Ireland and Wales, often contain large numbers of shell fragments, and as many as 37 species have been obtained from the Dublin hills. These shells have been brought to their present position by glaciers intruding on the land from the direction of the sea, and are not evidence of change of sea-level. Their Glacial origin may be confirmed by the appearance of a number of Arctic and northern forms, *Leda pernula*, *Astarte borealis*, etc., species which do not occur along our existing coast-lines. A second deceptive case which has to be guarded against is the storm-beach which may be found in favourable localities above sea-level, and which unless supported by collateral evidence such as a definite beach-line cut in rock or Boulder-clay, must be regarded as the result of wave-action working at present sea-level. A third type, which is the one I propose to deal with more fully, has the following characteristic.

At many points along our shores are to be found considerable collections of marine shells at varying heights above the sea. These formations sometimes extend for hundreds of yards along the coast and were long supposed to be "raised beaches." On closer examination however, the following variations from normal raised beaches were established. Gravel and sand were usually absent, the formation consisting almost entirely of shells. The number of species present were also very restricted compared with the number found in a normal raised beach. The shells were always those of full-grown individuals, and in all cases the species of marine mollusca used by man for food were most abundantly represented. These species are the Oyster, the Mussel, the Cockle, the Limpet and the Periwinkle. A series of investigations carried out on the shell-heaps of Denmark by Steenstrup revealed the presence of flint implements, fire-places with charcoal, and other evidence proving that these so-called "raised beaches" were the sites of settlements of prehistoric man.

During the earlier portion of the nineteenth century it was the fashion to style practically any naturally-formed bed of rolled pebbles a "sea beach," and when it contained sea shells to call it "portion of the ocean bed." These "sea beaches" existed from sea-level to the 1,000 foot contour-line, and were found by their supporters in the most unlikely spots; in fact no place, no matter how remote from the sea, need be without its "raised beach." With the progressive study of glacial geology and prehistoric archaeology most of these "sea beaches" were relegated to their proper positions, especially on the eastern coast of Ireland. In the west of Ireland the distances to be traversed barred research and the west remained, until very recent years, a land where supposed enormous fluctuations of the relative levels of sea and land had taken place. Kerry, Clare, Galway, and Mayo were counties from which Griffith, and in later years Kinahan, brought back stories of considerable accumulations of marine shells at hundreds of feet above sea-level. Very recently Professor A. F. Dixon and Dr. Gordon, in a paper read before the Royal Dublin Society, reported the existence of large deposits of marine shells in Curraun Achill, at

levels from 100 to 800 feet above sea-level.¹ The authors do not commit themselves to the theory that the deposits are "sea beaches," and indeed state that they only bring the matter forward in order to request an explanation of the facts, but the impression left on those who heard the paper read was that they were inclined to regard the usual theory favorably. The list of mollusca found was suggestive of human influence, and some of those present were content to keep an open mind on the subject. The cases were, however, ones to be investigated if possible, and on my return from Clare Island in July of the present year I visited the chief locality mentioned by Messrs. Dixon and Gordon. About three and a half miles west-south-west of Mallaranny the road to Achill Sound runs through a small valley which is bounded on the north and south by low cliffs, and is here about 100 feet above sea-level. In the crevices of the cliffs the shell deposits occur. The solid rock of the district is of Old Red Sandstone age, and consists of tabular sheets of pebbly conglomerate about one foot in thickness separated by flaggy micaceous sandstones, the whole series dipping very regularly south towards Clew Bay at an average of 10° . The differential weathering which has taken place is very marked, and can be seen strikingly developed on the sea-shore a few hundred yards distant. Here the waves have swept away the flaggy sandstones from between the sheets of conglomerate, and while the conglomerate itself is able to resist the onslaught of the sea, the steady undercutting which is going on eventually brings down great masses of rock. This marine erosion has its counterpart in the inland valley, and while the sub-aerial erosion is trifling compared with that effected by the waves, the results are still considerable and have a distinct bearing on the problem. A talus has been formed at the foot of the low cliff by the tabular masses and monoliths of conglomerate which have fallen as the result of

¹ Gordon and Dixon : Deposits of unbroken marine shells at high levels in the Curraun Peninsula, Co. Mayo. *Sci. Proc. Royal Dublin Society*, xi., 1905-08, pp. 325-327.

the sub-aerial denudation of the friable micaceous sand-stones. Many of these masses of conglomerate have a length of seven feet with a breadth of two feet, and on looking down into the crevices and hollows of this tumbled mass large numbers of shells are to be seen—the shells also occurring in two openings in the face of the cliff itself. The outstanding facts about this shell deposit are—the usual beach sand and gravel are both completely absent; the shells are not wave-rolled; the species present are all edible; and the Common Limpet (*Patella vulgaris*) forms by far the largest proportion of the shells present. The shells in no way recall those obtained from raised beaches; in most cases they are entire, and generally they are in the soft floury condition of shells long exposed to the effects of the atmosphere. The number of species (as given by Messrs. Dixon and Gordon they only come to eight) bears no comparison to the 30 to 60 species of a raised beach, and when the Limpet is present in the proportion of at least 200 to every individual of all the other species we can hardly doubt that we are dealing with a rock-shelter of prehistoric man. This view is confirmed by the condition of the openings in the face of the cliff itself. The floor of the first (east), on being worked over with a hammer, was found to consist of the heavy black dirt so characteristic of fire-places in kitchen-middens. No charcoal was found, but a water-rounded stone was turned up. This stone had been blackened by exposure to fire, and on one side had been fractured so that the rounded surface is abruptly truncated by a rough surface, which is also blackened by fire. Many of the shells show signs of having been in the fire. The second opening, though smaller than the first, has its floor composed of the same type of heavy black dirt, and was apparently also a fire-place. Scores of Limpets are stowed away at the back of both of these openings, but as they differ in no way from the hundreds of Limpets lying about under the talus, too much importance need not be given to their position. The site was probably chosen on account of the vast number of Limpets to be obtained from the adjoining coast, where at the present

day they occur in great quantities. That the site was occupied before the present talus was formed is probable when the large numbers of shells which can be seen in the chinks of it are taken into account. The deposit is certainly not a raised beach, nor a Glacial deposit. In my opinion it is a rock shelter of prehistoric times.

National Library of Ireland.

A NOTE ON DOOAGHTRY.

BY R. LLOYD PRAEGER.

To Dooaghtry I was introduced by Mr. A. W. Stelfox last July. It is a remote and interesting area, lying at the western base of Mweelrea, between it and the ocean, and forming the northern side of the entrance to Killary Harbour. Here are sandy beaches, backed not by dunes, but by great stretches of flat sand raised barely above high water mark, and running inland between rocky ridges sometimes as much as a mile, and fringing here and there shallow sand-bottomed lakelets. Great changes in the geography have occurred in recent times, as shown by the fragment of the ancient church and graveyard, raised twenty feet above the surrounding flat, which rises like a little tumulus on the edge of the Owennadornaun River. Its steep sandy slope is strewn with tall, uninscribed slabs, up to nine feet in length, some of which still stand huddled together, marking the graves on the summit. Around the scarp the ends of the coffins stand out; and skulls and bones go rattling down the slope into the stream, and are carried seaward.

The Ordnance map of 1839 differs strikingly from that of 1899, the latter showing new river-courses and lakes perviously non-existent.

Dooaghtry was found by Mr. Stelfox and his party to possess a remarkable and rich molluscan fauna, as will appear from the forthcoming Mollusca paper in the Clare Island series; but it is to its curious flora that I wish to draw attention.

The flat, damp, sandy waste, stretching from the beach inland to Corragoun Lough, is covered with a close sward, in which *Ænanthe Lachenalii*, *Sagina nodosa*, *Parnassia palustris*, *Leontodon hirtus*, *Epipactis palustris*, *Habenaria conopsea*, *Scirpus pauciflorus*, *Carex dioica*, *Selaginella selaginoides*, are characteristic species. As the ground gets wetter, *Sium erectum* and *Carex teretiuscula* come in, with *Bidens cernua* var. *radiata*, and in the water is *Elleocharis acicularis*, unrecorded from West Mayo, and a Pondweed of the *pectinatus* group. The rocky bluffs adjoining on the southward rise from the sand-plain in a steep scarp, clothed with an almost impenetrable belt of scrub full of fallen blocks, Hart's-tongues, and nettles, but possessing less floristic interest than the other types of ground. On the knolls above grows *Carlina vulgaris*, which has one of its few other stations off the limestone or limy sands on Inishturk, just opposite ; with it are *Juniperus nana*, *Antennaria dioica*, *Campanula rotundifolia*, *Thymus Chamaedrys*, *Agrimonia odorata*, and in sandy ground further southward *Viola Curtisii*, *Ranunculus bulbosus*, and much *Ophioglossum vulgatum*. Another deep inlet, filled with flat, damp sand, adjoins on the southward. Here a stream, which comes down from Mweelrea and sinks long before it reaches the sea, is banked up at each tide, and at the very head of the inlet it yields *Scirpus Tabernaemontani*, *S. rufus*, *Salicornia herbacea*, *Ænanthe crocata*, and *Ruppia rostellata*. It is overhung by rocky bluffs, supporting stunted trees of *Populus tremula*, *Quercus sessiliflora*, *Betula*, *Ilex*, and *Corylus*, with an undergrowth including *Thalictrum collinum*, *Erica mediterranea*, *Dabeocia polifolia*, *Osmunda regalis*, *Saxifraga umbrosa*.

I think it will be seen from these notes how curious and varied is the flora of this remote place—the typical Connemara flora adjoining and in some cases mixing with plants which we associate with the limestone plain, and which are brought in here owing to the presence of limy sands ; and both associated with marsh and salt-marsh floras of interesting types, which would well repay ecological study.

SOME TERRESTRIAL ISOPODA FOUND IN COS. DUBLIN AND WICKLOW DURING 1911.

BY NORMAN E. STEPHENS.

The following is a list of species of Woodlice which I have collected since the publication of "The Woodlice of Ireland," by Pack-Beresford and Foster¹; I have recorded only the rarer species (unless where peculiar varieties have occurred) which came under my notice during a stay of nearly three months in Greystones, and on previous and subsequent occasions in Co. Dublin. Three of the species mentioned, namely, *H. Mengii*, *T. pygmaeus*, and *P. dilatatus* were not hitherto known to exist in Co. Wicklow, although suspected in the case of the latter two. All except one specimen of *P. dilatatus* were found in the open air.

Trichoniscus pusillus, Brandt.

I took a peculiarly marked specimen of this common woodlouse in a rabbit-burrow near Templecarrig, Co. Wicklow, in April last. The mesosome is narrower and the metasome broader than in typical *T. pusillus*. The colour is of a rich cobalt blue with the usual ramificated markings on the body. The overgrowth of briars prevented me from making a further examination of this spot in the summer months.

Trichoniscus roseus, Koch.

Co. Wicklow: Glen of the Downs, Greystones, and at certain damp spots on Bray Head. Co. Dublin: in an old garden in the city.

Trichoniscus pygmaeus, Sars.

Six specimens of this minute woodlouse from a rabbit-burrow at Templecarrig, and one at Windgates, Co. Wicklow.

Haplophthalmus Mengii, Zaddach.

Plentiful under a large stone implanted in sand on Bray Head, and under stones at Greystones, Co. Wicklow. Co. Dublin: Rathmines.

Oniscus asellus, Linn.

I took a beautiful pale orange coloured specimen under stones at the ruined cottages on Bray Head.

¹ *Proc. R. I. Acad.*, vol. xxix.

Porcellio pictus, Brandt.

Among stones at the ruins on Bray Head, and under planks of wood. Greystones, Co. Wicklow. Co. Dublin: in a bathroom at Rathmines.

Porcellio dilatatus, Brandt.

Greystones, Co. Wicklow, among vegetable refuse (young specimens) and under wooden planks in a laneway used for supporting bathing boxes during the winter months (numerous). Co. Dublin: in a hot-house near Milltown, and in an old garden in the city.

Porcellio laevis, Latreille.

Numerous under fallen slates and stones of a ruined house near Blacklion, Co. Wicklow. Co. Dublin; in an old garden in the city.

Metoponorthus eingendus, Kinahan.

Six feet above high-water mark on Bray Head and at Greystones.

The three woodlice, *Porcellio scaber*, *Oniscus asellus*, and *Trichoniscus pusillus* were common in all the districts visited in the two counties, and *Philoscia muscorum* and *Armadillidium vulgare* in Co. Wicklow. Two days' careful searching of ants' nests on Bray Head was unsuccessful in finding *Platyarthrus Hoffmannseggii*, so that the species, if it exists (which is probable from its surrounding distribution) must be exceedingly rare.

It is interesting to note that specimens of *Trichoniscoides albidus* found here in the garden at Rathmines are much more coloured than those from the shores around Howth. The former have ramifications of orange on the anterior and middle of the mesosome, while the latter are perfectly white. These latter are also perfectly devoid of eyes.

Rathmines, Dublin.

A GENERAL INDEX TO THE *IRISH NATURALIST*.

Having frequently had occasion to refer to back volumes of the *Irish Naturalist*, I prepared for my own use a MS. index to vols. i. to xviii. inclusive, and thinking it might be useful to others, got it printed.

The index is now ready, and will be forwarded for 7s. to any person who cares to have a copy. The price looks very high, but even if every copy were sold, I would still be out of pocket.

RICHD. M. BARRINGTON.

Fassaroe, Bray.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY

Recent gifts include a Green Monkey from Mr. C. A. Lorenzer ; Ocelots from Mr. G. L. Andrews and Dr. Robinson ; a Civet Cat from Dr. H. Tweedy ; ten Prairie Marmots from Sir E. Loder ; a Mynah from Mr. J. S. Bernard ; Sparrow-hawks from Miss Rose Finch and Mr. W. P. Murphy ; a Merlin from Capt. T. Hone ; an Osprey from Mr. A. F. Montgomery ; a Kingfisher from Mr. E. Fennessy ; a Curassow from Sir Roger Casement, and a Little Grebe from Mr. J. Battersby. Two Sooty Mangabeys, a Brown Capuchin Monkey, two Common Marmosets, an Indian Fruit Bat, a Ratel, two Prevost Squirrels, a Kestrel, and a Pied Wagtail have been bought for the collection.

After four years' tenure of the office, Capt. L. C. Arbuthnot has resigned the Superintendency of the Dublin Zoological Gardens. Dr. B. B. Ferrar has been appointed by the Council to the vacant post, and has now entered on his duties.

BELFAST NATURALISTS' FIELD CLUB.

GEOLOGICAL SECTION.—SEPTEMBER 16.—EXCURSION TO COLIN GLEN.—There was a large attendance of members, who left Belfast by Falls Road tram, and on arrival at Milltown, walked by the Glen Road, to the bridge over the river. Owing to repeated " faulting " the Trias, Lias and Cretaceous rocks were traversed several times along the course of the stream, and Mr. Bell pointed out various interesting exposures on either side. Many of the characteristic fossils were obtained. The last section examined was at the waterfall, where the yellow sandstones are seen faulted against the Glauconitic Sands and Keuper Marls. A very fine photograph showing the waterfall and adjacent faulted Cretaceous and Triassic strata, taken by the President of the Field Club, is reproduced in the 1904 Survey Memoir of the Geology of the country around Belfast.

GEOLOGICAL SECTION.—SEPTEMBER 23.—EXCURSION TO GLENSHESK.—The party was under the leadership of Dr. Derryhouse. A start was made from Armoy, whence the members drove through the valley between Knocklayd and Croaghan. The valley runs nearly east and west, and falls slightly in the latter direction. At its upper (eastern) end, it is cut off by Glenshesk (running from south to north) a much deeper glen, and thus under present conditions there is no possible catchment for a stream capable of excavating the valley, which is in point of fact, now almost streamless. The leader showed how this valley had been cut by the overflow of a lake which temporarily existed in Glenshesk, and whose waters were held up by the ice of the Firth of Clyde glacier, which at that time stood across the mouth of the glen, in much the same way as the great Aletsch Glacier in Switzerland holds up the waters of the Mergilen Sea. Crossing on to the right (eastern) bank of the Glenshesk river, the party examined

several other similar overflow channels, which had at different periods discharged the surplus waters of a second ice-dammed lake which occupied the valley of the Glenmakeeran River. The waters of this Lake Glenmakeeran which were at a higher level than those of Lake Glenshesk, flowed through a deep gorge in the solid rock of the district and which is now streamless, into Lake Glenshesk, and thence by the overflow channel first mentioned, into the valley of the Bush River at Armoy. Several terraces of gravel in Glenmakeeran were also pointed out, and it was shown that these corresponded respectively to the levels of three channels which successively acted as overflows for the lake, it being explained that the terraces were deltas formed in the lake by inflowing streams, each delta assuming the level of the waters at the time of its formation.

NOTES.

BOTANY.

Records of Irish Fungi.

Since the publication of my last note (*supra* p. 181) I have received another parcel from Professor Gwynne-Vaughan, including the following species :—

From Lough Nahaltora, Co. Galway : *Belonidium lacustre*, Phill., on culms of *Scirpus lacustris* ; *B. pullum*, P. & K., on culms and sheaths of *Phragmites* ; *Stagonospora dolosa*, S. & R., on culms of *Phragmites*.

From Clare Island, Co. Mayo : *Puccinia conii*, Fckl., on *Conium maculatum* ; *Cystopus candidus*, Lev., on *Senebiera Coronopus*.

W. B. GROVE.

The University, Birmingham.

Two Plants new to Ireland.

During the recent visit of the International Phytogeographical Excursion to Ireland, where they were so ably conducted by Mr. R. Ll. Praeger, Dr. Ostenfeld and myself independently found the water-lily *Castalia candida* (Presl.) (= *Nymphaea candida*, Presl.) in two loughs near Craiggamore, and also near Roundstone, Co. Galway. Dr. Ostenfeld had previously shewed me the plant in Perthshire, near Dunkeld. At Killarney I was fortunate enough to meet with *Viola epipsila* Lideb, only recently added to the British flora, the writer having gathered it in Berks and South Devon. Further details of both species will follow. In Cornwall Mr. P. Williams shewed the members the hybrid heath described as *Erica cinerea* × *E. vagans* (*Journ. Bot.*, 334, 1910) ; but an examination of it in the fresh state convinced me that the determination was not correct, so in answer to my request, Mr. Williams kindly motored Dr. Graebner and Dr. Schroeter over to the native habitat, when a close examination showed that although its appearance recalled *E. Mackayi*, yet the ovary was hairy, and both the foreign specialists agreed with me in considering it to be *Erica Tetralix* × *E. vagans*, both of which species grow in the vicinity.

G. CLARIDGE DRUCE,

Oxford.

***Utricularia ochroleuca*, Hartm.**

In 1894 I collected at Recess a puzzling Bladderwort, which I labelled "*Utricularia intermedia* ? with bladders on leafy stems. Growing with typical *U. intermedia* and *U. minor*, bog-hole, Recess, Connemara, May, 1894." The plant has lain so named in my herbarium until September last, when a visit of Dr. Glück of Heidelberg, a special student of this group, has resulted in its being identified as *U. ochroleuca*. This plant, but recently definitely recorded from the British Isles (*I. N.*, 1910, p. 237) is now known from a number of stations in Scotland, its only Irish (and first Britannie) station being Kylemore in Connemara, Druce, 1875. Mr. Druce has fully discussed this plant and its distribution in a recent number of this journal (pp. 120-122 *supra*). I may add that another feature, which Professor Glück says is characteristic, is conspicuous in my specimens, namely, that the hybernaculum, instead of being compact and egg-shaped as in *U. intermedia*, becomes lax, slender, and elongate, being about half an inch in length, and only half the breadth of those of *U. intermedia*.

R. LLOYD PRAEGER.

Dublin.

ZOOLOGY.

The Distribution of the Marine Copepoda.

The distribution of the Copepoda is a subject which has received increasing attention in recent years, and in this connection it is interesting to note the issue of the first parts of a work on the subject by Mr. G. P. Farran. We have received copies of the first two parts which are published by the *Conseil permanent international pour l'Exploration de la Mer*. Mr. Farran's work is a summary of the results of the international investigations carried on in the waters of north and west Europe in the years 1902—1908. In these two parts twenty-three species are dealt with in detail. Each is taken up individually and the facts relating to its distribution are summarized under several headings, such as:—"General Distribution and Biology" "Distribution within the regions investigated" "Relations to the hydrographical conditions"; "Economic importance" and "Observations still to be made."

Of special interest are the results which have shown the existence of a distinct periodicity in the occurrence of certain species. This has been done particularly in the case of *Paracalanus parvus*, *Pseudocalanus elongatus*, *Metridia lucens*, and *Calanus finmarchicus*. As regards distribution in Irish waters the last two are the most interesting. From February to May *Metridia lucens* is abundant on the west coast as far north as Belmullet, and only moderately common in the Irish Sea. From August to November on the other hand it extends northwards only as far as Aran, while it becomes at the same time extremely abundant in the Irish Sea. The facts with regard to *Calanus finmarchicus* are more accurately known than in the case of most of the species, and the seasonal fluctuations in its occurrence are well established. Speaking of the west

coast of Ireland, Mr. Farran says "*Calanus finmarchicus* is moderate or scarce in February, very abundant up to 20 or 30 miles from shore in May and August, becoming moderate again in November. Off Cleggan, Co. Galway, the increase in numbers appears to begin in March and to reach its maximum by the end of April, after which the numbers decrease gradually being very low from September to February."

The value of Mr. Farran's work is greatly enhanced by the excellent series of maps which accompany each part. These show at a glance the limits of the occurrence of each species, and the localities where it has been found in the greatest abundance. The preparation of the maps must have involved a great amount of painstaking labour, and the result is all that could be desired; they are at once elaborate and clear.

COLIN M. SELBIE.

National Museum, Dublin.

Black-tailed Godwits in Cos. Wexford, Waterford and Cork.

I have had under observation for thirteen days, 27th Sept.—9th October, some birds which I will describe as I saw them. They were on the mud-banks of the estuary of the Colligan River, at Shandon near Dungarvan, and appeared fully twice as large as the Redshanks beside them, but not quite so big as Curlews. They did not carry themselves huddled up with the head drawn back, like Curlews, when walking, but were slim and graceful. The beak was long and straight, its prominent part looking pink in the sunshine; and in feeding the beak was rammed down into the mud, so that the eyes were occasionally submerged. The top of the head was very dark, there was a light streak or band over the eye, and the chin and cheeks were also light-coloured; the neck and shoulders were chestnut or rufous brown. There was a white bar along the middle of the wing, while the rump and tail were white, except a broad band of black across the end of the tail. The belly and under tail-coverts were also white. Since writing the above description we have shot two of the birds which prove, as I expected, to be Black-tailed Godwits. They are immature, but full-grown birds, a male and a female. After these were shot I saw six survivors. I learn from my friend, Major Barrett-Hamilton of Kilmanock, Co. Wexford, that others occurred near his place (which is close to Waterford Harbour), on Sept., 22nd, and that one of them has been shot. In August, 1901, Captain L. A. Otway shot two out of a considerable number on Wexford Harbour, and Mr. W. B. Barrington observed a flock in October, 1909, and again in February, 1910 on Cork Harbour, one of which was shot.

These Godwits should be looked for in August and September, the months in which they most frequently visit us. They are irregular visitors to Ireland on migration, occurring mostly on tidal estuaries, but have also been repeatedly met with inland. They might easily be mistaken at a distance for Curlews by anyone who did not take note of their distinctive characters, or who had not a good glass.

R. J. USSHER.

Cappagh, Co. Waterford.

THE RELATION OF THE PRESENT PLANT POPULATION OF THE BRITISH ISLES TO THE GLACIAL PERIOD.

BY CLEMENT REID, F.R.S.

[The following communication, made to a joint meeting of the Botanical and Geological Sections of the British Association at the recent meeting at Portsmouth, was brought forward by Mr. Clement Reid as the opening to a discussion on the subject to which it refers—a discussion in which Dr. Scharff, Dr. Stapf, Professor Schroeter, Mr. W. B. Wright, Professor Drude, F. J. Lewis, Dr. Ostenfeld, and Dr. Arber took part; also, by means of letters, Dr. A. R. Wallace, Dr. Marr, and Professor Kendal. In view of the discussion on this and kindred subjects that have recently taken place at the Dublin and Belfast Field Clubs and elsewhere, Mr. Reid's opening statement is of interest to our readers—none the less so since Mr. Reid's views differ widely from those held by the majority of Irish Naturalists—and by permission of the author and the Council of the Association, we reprint it here.—EDS.]

THE distribution of our British plants has long been a puzzle to the botanist, and no explanation was forthcoming till the cause was searched for in bygone changes of climate, and changes in the distribution of land and sea. A century ago it was generally supposed that species had originated mainly in the districts in which they were then found. But even under this hypothesis the anomalies of discontinuous areas seemed to require explanation, for the same species was not likely to originate at several different points.

With the growth of the idea of gradual evolution it was realised that faunas and floras had a past history, even if the included species had remained unchanged. Botanists recognised that there were many points that required explanation. For instance, it was noticed at an early date that each of our mountain-tops possessed a small outlying fragment of the arctic flora. How came it that the same species occupied so many different mountains? This seemed a perfectly fair subject of inquiry, even to naturalists who hated the very idea of evolution when applied to species and genera.

More than sixty years ago a great impetus was given to this study by the discovery that Europe had passed through a most remarkable series of climatic changes, and that, too, during the lifetime of the existing species of animals and plants. There had not been a mere cooling of the climate ;

the temperature in these latitudes had sunk far below its present level, and then had again risen.

Edward Forbes, in 1846, seized this clue, and explained through it, as relics of the Glacial Period, the arctic plants stranded on our mountain-tops; they were plants left behind when the climate became too warm for them any longer to survive on the plains. The subsequent discovery of fossil remains of these plants scattered over the plains and often associated with relics of arctic animals now extinct in Britain, seemed a brilliant proof of Forbes' view, which has been generally adopted.

In some curious way, however, botanists and zoologists both seem to have overlooked the difficulty that, granting Forbes' hypothesis to be sufficient to account for our alpine flora, it rendered more difficult instead of easier the explanation of our southern flora, which occurs in a similar way stranded in some of the warmest low-lying parts of Britain.

We meet to-day to discuss this question, in the hope that botanists, zoologists, and geologists may realise each other's difficulties, and may be able in combination to give a clear teaching on this important problem of geographical distribution.

The discussion I have been asked to open is limited to the relation of the present Plant Population of the British Isles to the Glacial Period. Our problem is a special one; it is not the same as that which confronts the botanist on the Continent of Europe or America; and it is not the problem of the origin of the flora of an oceanic island. Also, the wider question of the origin of the species composing the British flora is outside the discussion, for it would lead us into too many untrodden bypaths, and could not satisfactorily be gone into in the present imperfect state of our knowledge.

Perhaps it will be well to explain at once why the inquiry is thus limited to comparatively recent periods, and how it is that we need not explore the unknown earlier periods and deal with larger questions.

Our first inquiry in this case must be: Has there been any continuous occupation of Britain by a temperate flora and fauna from pre-Glacial times to the present day? Or, to put it in other words: Are any of our plants survivors that

managed to live through the cold of the Glacial period in some warm nook in Britain? They evidently found a refuge somewhere, for we know that the same temperate species that live in Britain now were here in pre-Glacial times. But was this refuge in Britain?

Here geology comes to our aid, and I think that all geologists who have made a special study of the climatic conditions will agree with me. Any survival of our flowering plants, except in the case of a few arctic and alpine species, was quite impossible.

It may come as a shock to some of my colleagues when I say that for this particular discussion we have a perfectly definite starting-point. We have merely to account for the incoming of our existing flora, after an earlier assemblage had been swept away almost as completely and effectually as the celebrated volcanic eruption wiped out the plants of Krakatoa.

In order to make clear the existence of this limitation, and for the convenience of the discussion, I have prepared certain maps, which are now shown. I propose now to say a few words as to the bygone climatic and orographic changes indicated on those maps, and on their bearing on the existing flora of Britain. I must say at once, however, that you must not take these maps as absolutely exact statements as to the climatic and geographic conditions at the different stages involved in our inquiry. But they give the result of many years' work at this subject, and, I think, may be accepted as embodying the main factors which dominate the question we have to discuss.

We know that during the grèatest intensity of the cold all Scotland, Ireland, and the greater part of England were buried under ice and snow—except, possibly, for some high peaks on which a few arctic species survived. Ice filled the North Sea and covered the lowlands of England down to the mouth of the Thames. Without crossing the Thames it almost reached London. Its southern limit stretched to South Wales, where tongues of ice reached the Bristol Channel in big glaciers like those of the Antarctic Regions or Greenland. In South Wales a few hills may have escaped, though surrounded by ice.

The glaciation in Ireland was even more extreme, for apparently no part of Ireland escaped. Even the warmest parts of the south-west are striated and covered by morainic material, the ice extending well out into the Atlantic. The icebergs were so big, or the ice-foot so thick, that, breaking away from the Irish coast, the masses were able to float across to the Scilly Isles before they melted ; for they carried with them numerous striated stones of well-known rocks, now found stranded on the highest parts of the Isles of Scilly. Thus it is evident that in those days Scilly, our most southerly and warmest point, was surrounded by a bitterly cold ocean, and it was submerged to such an extent that it could be overridden by pack-ice. Could any temperate plant survive such treatment ? I particularly want you to realise the climate that Scilly enjoyed in those days, for it is now one of the warmest spots in our islands, and its temperate flora has come back, though the islands are surrounded by fairly deep sea.

It seems evident, therefore, that a temperate flora could not have survived the cold in Ireland or in the Scilly Isles. But there is still the non-glaciated area south of the Severn and Thames to consider, and botanists may tell us that the temperate flora survived in some warm nooks in Devon or the Isle of Wight. Here, however, we can point to evidence that the botanist himself must accept as conclusive.

In the south of Devon one of the warmest of the sheltered valleys is that through which the Teign flows to Newton Abbot. But in the alluvial deposits of this valley, and only a few feet above the sea-level, Professor Oswald Heer and Professor Nathorst discovered leaves of the dwarf Arctic Birch and some Arctic mosses.

Time will not allow us to go into all the evidence ; so I will only point to one or two other areas which prove the extreme rigour of the climate in the South of England. Close to Salisbury are found in profusion remains of various Arctic mammals—Reindeer, Musk Ox, Arctic Fox, lemming, and several others. Unfortunately plants do not seem to have been searched for, and the sections were obscured when I visited the pit ; however, the flora associated with this assemblage of mammals can only have been the flora of the Arctic regions.

To come nearer home, around Portsmouth itself we have abundant evidence of this icy sea, for in the peninsula of Selsey especially we find numerous large erratic blocks floated by ice. Some of them have been identified as coming from the Isle of Wight, others from Bognor and Cornwall, and a number came from the Channel Islands. Thus even the north coast of France had its shores fringed with ice.

I have attempted to show on a map what the Channel was like when Spithead was thus blocked with ice-floes. Is it possible to believe that the plants of the south of England, many of which can barely hold their own during a severe winter nowadays, could have survived these arctic conditions ?

If the southern plants were completely swept away by the cold, the question arises : How did they come back again especially to islands like Ireland and the Isles of Scilly, and how did they obtain their very singular present geographical distribution ? We are told that the matter is simple enough, for Britain has often been connected with the Continent, and the plants spread slowly overland. However, before we adopt the view that for animals and plants to spread to islands it is needful to have land-connection, you should remember Krakatoa, and the rapidity with which the exterminated flora has come back. Also I must point out that there are peculiarities in the distribution of the different elements that go to make up the existing British flora that no land-connection will explain. Look at the recent distribution. One of the most striking peculiarities is the Pyrenean element in our flora. It is practically confined to two areas, the one in Cornwall and the other in the West of Ireland. Geologists nowadays will not agree to the reconstruction of a lost Atlantis to account for this peculiar distribution.

Undoubtedly since the Glacial period our islands have seen several oscillations of level. There has also been widening and narrowing of straits and channels. England has been connected with France near Dover, and also across the North Sea with Holland and Denmark. But 20 or 25 metres seem to have been the approximate extent of the rise in the south of England. I have searched in vain for

evidence of a greater movement. A shallowing of the sea by 25 metres is not nearly sufficient to connect Ireland with England or Scotland, or the Isles of Scilly with England. Still less would it suffice to connect the West of Ireland or Cornwall with the Pyrenees, where the peculiar plants find their home. A rise of land to this amount would not even bring Scilly and the Land's End appreciably nearer together.

This limitation of the extent to which we can bridge over the gaps between our islands is, however, a point on which there is much difference of opinion, and I will not insist on the conclusiveness of the evidence as to the extent of the oscillations.

From the botanist's point of view there are, however, other archipelagos besides those surrounded by water. No doubt if we can postulate sufficient orographic changes plants would spread slowly from land to land during the few thousand years that have elapsed since the cold died away. But—and this 'but' is all-important—they would only do so if the soils were suitable. An isolated tract of limestone surrounded by clay or by sand is as much an island, as far as many of our most peculiar plants are concerned, as if it were surrounded by water. We have many such islands—or oases is perhaps a more suitable term for them—and no possible ups and downs of the land will connect them. Many of them, like the central limestone district of Ireland, or the Peak District in Derbyshire, or the West Yorkshire carboniferous limestone, must have been isolated from far-distant geological periods, from times before the present flora of Britain had any existence. We have a still more difficult problem than this. Britain is divided into numerous river-basins, for most of which any connection with other basins in post-Glacial times is unthinkable. Yet each basin yields numerous aquatic plants and animals of the same species as those found in other basins cut off by high hills. Isolated lakes have their aquatic flora; and even artificial ponds, such as the dew-ponds of our high chalk downs, have a fauna and flora closely proportionate in the number of species with the time that has elapsed since the pond was made, or since it last dried up. If no actual connection between river-basins or isolated ponds is needed for the spread of

aquatic plants, why need we postulate a land-connection for the land-plants, or a bridge of limestone to aid the migration of the limestone plants from crag to distant crag? Aquatic plants and limestone plants must obviously in most cases have taken leaps of many miles to arrive at their present stations. Our plants have far greater power of crossing deserts and seas than most botanists are willing to allow.

Let us examine the present distribution of one of the most interesting groups of British plants. The Atlantic or Lusitanian plants form an assemblage belonging mainly to the Pyrenees, and found also in the S.W. of England, and again in S.W. Ireland. But they do not occur in the intermediate districts. If we look more closely into the composition of this Atlantic flora, as it is represented in Britain, we find that only plants with small seeds have been able to cross to Cornwall and Ireland, those with large seeds being left behind on the Continent. There is only one tree among them, and that is the *Arbutus*, one of the few trees with minute seeds now living in Europe. A further examination confronts us with the puzzle that, whilst various Pyrenean species are found also in Cornwall and Kerry, the species occurring in Cornwall and Ireland are not the same. The *Arbutus* is a case in point; it is wild in Ireland, but in no part of England. *Erica ciliaris* and *E. vagans* are English, and not Irish; *E. mediterranea* is Irish, and not English.

The local distribution of these plants is equally strange. A few, like *Pinguicula lusitanica*, have spread throughout the west country, wherever the conditions are suitable. Most occur, however, in quite different fashion; they are abundant over certain limited areas, to which they are strictly confined, but they are absent from other adjoining areas, though equally suited. I have mapped and examined a good many of these areas, and the plants seem in most places to be spreading vigorously from certain definite centres, to which chance has transported a seed. Thus, *Erica ciliaris* is confined to three localities in Cornwall, Devon, and Dorset. *E. vagans* occurs abundantly in the Lizard and again on quite different soil in North Cornwall,

so that the serpentine soil has nothing to do with its present distribution.

Chance introductions of seeds during thousands of years explain the existing peculiarities of geographical distribution in a way that no changes of sea or land or climate will do. Our alpine flora consists largely of survivors from a colder period ; the rest of our flora, on the other hand, is constantly being added to by chance introductions from the nearest continental shore. That is why the Atlantic element, and the eastern element, though not consisting to any great extent of maritime plants, are confined mainly in Britain to areas within a few miles of the coast. Seeds are evidently brought from the Continent and scattered broadcast over certain coastal districts, and they grow and spread where soil and climate are suitable. But the post-Glacial period has been so short that the process is still incomplete, and the slow spreading inland has only as yet extended a few miles. We can still fix the point or points of introduction.

The most striking elements in the British flora, except the arctic and alpine species, have a marked coastal distribution. The plants found correspond with those of the land opposite (in which they are often inland, as well as coastal). Thus the Cornish plants and those of S.W. Ireland contain a large Pyrenean element ; Norfolk plants correspond with those of the opposite shore of the North Sea ; even two or three American plants are found on the coasts facing America.

All the evidence seems, therefore, to point to a steady change and increase in our flora, due to occasional introductions. These introductions are, I think, now mainly due to birds driven by exceptional gales. But herds of migrating bison, deer, and horse have played their part, especially when the Straits of Dover were much narrower or non-existent. Packs of wolves which hunted the large game, foxes, cats, and especially raptorial birds which waited for and struck down the tired migrants, must also have assisted. Fences and the destruction of wild animals have probably rendered the process far slower than formerly ; but it still goes on, as anyone can see who notes the constant occurrence of seedling oaks miles from the nearest tree.

If I am right, therefore, there is no such thing as a native plant in Britain. Our flora has been swept away like that of Krakatoa; but we have arrived at a much later stage of the re-peopling in our islands. It seems to me far more interesting to watch this process of introduction, change, and spreading than to enter into speculations as to what species shall be listed as 'natives,' 'denizens,' or 'colonists.' No such differences exist; it is all a question of degree.

Britain for several thousand years has been receiving colonists from all sources, and the process still goes on. The oldest element in our flora, the alpine, occurs on nearly all our mountains; for it once occupied the intervening areas, and it does not greatly depend on conditions of soil. The limestone, aquatic, and Lusitanian floras, on the other hand, are more recent introductions; they can never have occupied continuous areas, and their present distribution is full of singular anomalies. These three elements of our flora are steadily growing in importance, whilst the alpine element is stationary, or tends to die out.

Geological Survey, London.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

His Majesty the King has graciously deposited in the Dublin Gardens some animals from his South African collection lately exhibited in London. These are two Vervet Monkeys, two Blotched Genets, and six Spurred Geese.

Recent gifts include a young Otter from Mr. J. Darcy, a Persian Cat from Mr. H. Cooke, Rabbits from Mr. H. Fottrell and Mrs. Stuart, a Lanner Falcon from Mr. H. B. Rathborne, a Sparrow-hawk from Mr. Priestly, three Jacobin Pigeons from Miss V. Stockley, four Nun Pigeons from Miss French, three Ring-necked Parrakeets, a pair of Grass Parrakeets, eight Grey-breasted Parrakeets, a Moustache Parrakeet and four Cockateils from Dr. B. B. Ferrar, and a West African Tortoise from Mr. J. Scott Byrne. A Mona Monkey has been placed in the collection on deposit. A Macacque Monkey, a pair of Weeper Capuchin Monkeys, a Serval and a female Capybara have been acquired by purchase.

Considerable progress has been made with the hospital, which will afford, when completed, much-needed accommodation for sick animals and a place of isolation where suspected cases can be kept under observation.

Recently a fine young male Lion and a pair of Lion Cubs have been shipped from Dublin for the Melbourne Zoological Gardens, Australia.

ON THE INHERITANCE OF PITTED
LEAF-BLOTCHINGS IN *ARUM MACULATUM*
AND ON FLORAL VARIATIONS IN THE SPECIES.

BY NATHANIEL COLGAN, M.R.I.A.

SOME eight years ago, in the March issue of this journal for 1903, I drew attention to a peculiar form of *Arum maculatum* occurring in Co. Dublin, a form in which the purple-brown maculations of the leaf were indented or pitted on the lower surface so as to produce what were called pseudo-blisters or protuberances on the upper surface. This paper gave rise to an interesting discussion on the whole subject of leaf-blotching in this species, and on the distribution of the maculate-leaved variety in the British Isles and on the Continent. In the course of this discussion it appeared that the pseudo-blistering had been observed, though rarely, in other stations, and that the pittings were found to occur in some cases on the front or upper surface of the leaf so as to cause answering protuberances to appear on the back. Dr. Pethybridge (*Ir. Nat.* xii., p. 149), observed such indentings of the upper surface, as also did Mr. R. A. Phillips (*tom. cit.*, p. 205), and later (*Flora! Co. Dublin*, 1904, p. 206) I recorded the finding of a similar form by Miss C. G. O'Brien near Foynes, Co. Limerick, and by myself at Newcastle, Co. Dublin, in 1904.

In the present paper it is proposed to give some notes on the behaviour of several plants with blotched and pitted leaves removed from the Newcastle station, and grown in my garden for a period of 7 years, 1904 to 1911.

The first shoots from these transplanted tubers appeared over ground usually in the first week in February of each year, and on their first appearance the dark blotches showed clearly on the outer surface or back of the closely furled leaves. Even in this early stage, the nascent protuberances could be traced in the region of the blotches. As the leaves unfurled, the indentations or depressions on the upper surface were exposed to view, and answering blister-like elevations stood out prominently on the back (see *Ir. Nat.*, xvi., 177). The leaves, in fact, for seven successive years

showed precisely the same blotchings, pittings, and protuberances as had been observed on the plants when removed from their station by a shaded roadside at Newcastle. The blotchings and pseudo-blisters are then not adventitious. They arise from some inherent peculiarity of the plant which bears them.

The question next presented itself, is this capacity of producing repoussé leaf-maculations hereditary in the fullest sense of the word? Can it be transmitted by seed from one generation to another? For some time I despaired of finding any answer to this question, as the garden plants for three years after removal from the Newcastle station showed no signs of flowering. At length, however, in May, 1908, two flower-spathes made their appearance, each marked inside with large red-brown blotches. But nothing came of this flowering. Both of the flower-spikes faded away without leaving behind a vestige of fruit.

On the 7th May of the next year, 1909, three flower-spathes appeared, two on one plant and the third on another at some four inches distance, all three spathes being blotched as had been those of the previous year. Some four months later, on the 2nd September, I found that one of the three flower-spikes had formed a head of 11 well-developed fruits. These were gathered on the same day and yielded 11 seeds (one for each fruit) which were forthwith planted in a large flower-pot in ordinary potting mould. The pot was removed indoors and kept moist by occasional watering. Some six and a half months after this sowing, about the 25th March 1910, as no sign of germination was apparent above the soil, I dug up one of the seeds and found that it had not only germinated but had developed a rudimentary tuber at the end of a highly curved germination shoot or cotyledon proceeding from the empty seed-coat. This shoot was curved almost into a semicircle, the empty seed-coat at one end and above, the tuber at the other end and below, with its radicle or primary root issuing from the base. The young germination-shoot was replanted, and three months later, in June, 1910, the surface of the soil was again closely examined for signs of growth. No trace of a shoot, however, was visible above the soil, and being at the time ignorant of

the peculiar life-history of the species, I assumed that all of the seeds had rotted away; and so the flower-pot was laid aside and the experiment set down as a failure.

After the lapse of another three months it occurred to me that I might have too hastily assumed that all the seeds had perished, so on the 1st October, 1910, I carefully stirred up the soil in the pot and was surprised to find seven well-developed tubers about the size of an ordinary Sweet-Pea seed. From the crown of each tuber proceeded a shoot of about half an inch long, sheathed below and showing at the summit a faintly green leaf-tip. The seed-shells and primary germination-shoots or cotyledons had all disappeared. The radicle, too, was gone, only the faintest vestige of its old attachment showing as a slight scar at the base of the young tubers, but a few nascent roots appeared near the crown of the tubers. After examination, the tubers were immediately re-planted; the soil was kept well watered and, finally, on the 12th October, 1910, precisely 13 months and 6 days after the sowing of the seed, the first leaf-shoot appeared above ground.

The other leaf-shoots made their appearance in fairly rapid succession. By the 23rd October, seven shoots were over ground, by the 4th November, eight, by the 6th November, nine, by the 11th, ten, and, finally, on the 22nd February of the present year, 1911, the last or eleventh shoot made its appearance. The slow evolution of the closely furled leaves was watched with interest, and at last, on the 30th October, 1910, a distinct brown blotch was made out on the back of the leaf which had first appeared above ground. A second blotched leaf was observed on November 4th, a third on December 15th, a fourth about the middle of January, 1911, and a fifth on the following 22nd February. By this time several of the young plants had grown to a height of an inch and a half, and two of them to fully two inches, with elliptic acuminate leaves one inch long and showing no trace of a basal sinus. The pseudo-blisters stood out prominently on the backs of the blotched-leaved plants and corresponded accurately with the outline of the blotchings, which were usually large and oblong, measuring almost $\frac{1}{8}$ inch, save in one leaf where they were hardly one-sixteenth

of an inch long. Six of the 11 plants bore leaves absolutely immaculate and unpitted.

This division of the seedlings into spotted and unspotted forms at once suggested the action of Mendelian factors, and having discussed the problem with Mr. G. P. Farran, he proposed the following solution, which it seems to me is one that further experiment may very likely prove to be true. On the assumption that we have here to do with Mendelian characters, he regards the 11 seedlings as the outcome of a cross between a pure-bred immaculate-leaved plant and a hybrid spotted and pitted-leaved plant. In accordance with Mendel's laws such a cross should produce equal numbers of the two parent forms, and this result has occurred in the case of the Newcastle fruiting *Arum* as closely as is possible in dealing with an odd number of seeds. On the same assumption as to the hybrid nature of the plants and the Mendelian character of their spots and pittings, a cross between two of these hybrids should have given rise to 3 spotted seedlings for every one unspotted, or say 8 spotted to 3 unspotted out of the 11 seeds sown. And such a cross might very easily have taken place since two of the assumedly hybrid Newcastle plants flowered side by side in my garden in May, 1909. The actual proportion of spotted to unspotted seedlings produced may be taken, then, as showing that no such crossing of hybrids did in fact take place, but that the fruiting plant which bore the 11 seeds was fertilized by the pollen of an ordinary unspotted *Arum*. The only *Arums* grown in my garden were the spotted and pitted Newcastle plants, so that the fertilizing pollen must have been insect-borne from outside. The ordinary unspotted plant grows certainly within one-third of a mile of my garden, and may perhaps grow much closer at hand in copses which I have not examined. The problem is one that invites further experiment with artificial fertilization.

Some time after I had completed the observations just recorded, it occurred to me to look into the literature of the subject, and by the kind assistance of Dr. Pethybridge and Prof. Johnson, I was enabled to study at first-hand two important papers on the development of *Arum maculatum* to which they drew my attention. The first was a paper by

Rina Scott and Ethel Sargent, "On the development of *Arum maculatum* from the seed," which appeared in the *Annals of Botany* in 1898 (vol. xii., 399); the second, an article in Dr. Kirchner's *Lebensgeschichte der Blütenpflanzen Mitteleuropas*, published in 1909 (Band i., Abtheil. 3), and giving a full and interesting resumé of the result of observations made previously to that year.

In one of the foot-notes to the first of these papers the authors state that in England the *Arum* seeds ripen in July and germinate in autumn, yet a study of the text seems to show that seeds from Devonshire plants sown by them in July, 1895, did not germinate until early in the following January, while the first leaf did not appear above ground until the spring of 1897, or some 19 months after the sowing of the seed. In the *Lebensgeschichte* a summary is given of the results obtained by Irmsch with plants grown in Germany, where the fruit matures in September, as it usually does in Ireland. These results agree rather closely with those obtained by Scott and Sargent with Devonshire plants. German seeds sown as soon as ripe were found by Irmsch to germinate, as a rule, in the following spring, while the first leaf appeared over ground, as a rule, in the third year after sowing. In exceptional cases, however, he observed the first appearance of the leaf to take place in the autumn of the second year, as occurred with the Irish seeds sown by me in September, 1909.

In exploring the literature of this very interesting species a curious lack of unanimity came to light in the views of different authorities as to the number of seeds produced by the fruit or berry. In Smith's *English Flora*, 2nd Ed. 1830, and in Withering's *Arrangement*, 4th Ed. 1837, the fruit is set down as containing "several seeds"; Ray (*Synopsis*, 3rd Ed., 1724) and Haller (*Hist. Stirp. Indig. Helveticæ*, 1768) both give the number of seeds as 1 or 2; Hooker's *Student's Flora*, 3rd Ed. 1884, has seeds 2 or 3; Babington's *Manual*, 9th Ed. 1904, "seeds mostly 4 or 3 or rarely 2"; and finally, not to pile up discordant authorities, Scopoli in his *Flora Carinthiaca*, 1760, fixes the number of seeds at 2. This unexpected diversity of opinion induced me to examine for myself a large series of Irish *Arum* spadices in various

stages of growth. For the greater part of the material used in the inquiry, some 250 flowering or fruiting spikes, I am indebted to the kindness of friends, above all to Mr. R. A. Phillips, who collected for me in Galway, Tipperary, Cork, Wexford, Kilkenny, and Queen's Co. Material from Derry was sent me by Mr. W. E. Hart; from Co. Down by the Rev. Canon Lett; from Wicklow and Kerry by Mr. W. F. Gunn; and from Co. Dublin by Mr. R. W. Scully.

A total of 341 ovaries or immature fruits were dissected in the month of May, 1911, to ascertain the number of ovules, and 661 mature fruits or berries were examined between the 8th September and the 3rd October of the same year. The result was to show that the ovules were much more numerous than the ripe seeds and that the number of both seeds and ovules was variable. The number of ovules per ovary ranged from 2 to 8, the average being 4.8. Out of the 341 ovaries examined 300 had from 4 to 6 ovules each, none had less than 2, 23 had from 2 to 3, and 19 had from 7 to 8 ovules. In contrast with this distribution of the ovules, the 661 ripe fruits examined gave an average of 1.4 seeds per fruit, the numbers ranging from 1 to 4. No less than 443 of the fruits were one-seeded, 163 had 2 seeds, 45 had 3, and only 10 had four.

In Ireland, then, less than one-third of the ovules of *Arum maculatum* come to maturity, and, since 606 out of the 661 Irish fruits examined had either 1 or 2 seeds, it is clear that Ray's and Haller's accounts of the fruit are, for Ireland, at all events, much nearer the truth than either Hooker's or Babington's.

This abortion of more than two-thirds of the ovules of *Arum maculatum* is, no doubt, mainly due to imperfect pollination, as is the entire abortion of the fruit which not infrequently takes place in this species. An examination of 22 fruiting spikes from the counties of Kilkenny and Wexford made in September last showed that 70 out of a total of 595, or fully $11\frac{3}{4}$ per cent. of the fruits, were completely aborted. The number of aborted fruits and ovules is probably in inverse ratio to the number of insect visitors to the spathe. In the majority of the fully opened Irish spathes examined

dead specimens of the dipterous insect, *Psychoda phalaenoides*, were found, the numbers ranging from 3 to 30 per spathe. According to Kirchner (*loc. cit.*) this is the only insect proved to effect pollination of the Arum, and as many as 4,000 individuals have been found in a single spathe.

Numerical variation in *Arum maculatum* is by no means confined to the ovules and seeds. It extends to the whole inflorescence, which, as is well known, is made up of four distinct members or divisions, the female flowers or pistils, the pistillodes, the male flowers or anthers, and the staminodes, taking them in order from below upwards. The range of variation and the average for each of these divisions of the inflorescence is set out in the following table founded as regards the pistils on an examination of 204, and as regards the other members of 123 spadices.

NUMERICAL VARIATIONS IN THE INFLORESCENCE OF ARUM
MACULATUM.

—	Pistils	Pistillodes.	Anthers.	Staminodes.
Range .	11 to 56	11 to 55	46 to 150	20 to 70
Average .	30.3	12.5	89.0	42.0

The most remarkable colour-variation observed was a species of albinism in which the club-shaped extremity of the spadix, usually a deep crimson-purple, was cream-yellow or yellow blotched with green. Out of 204 flowering spathes examined, 20 showed the latter variation, the colour of the club suggesting mouldy Stilton cheese; only 5 showed the cream-yellow variation. As a rule the pale-clubbed spadices bore pale yellow anthers and staminodes, though in some cases the colour was pale pink, whereas in the ordinary purple-clubbed spadices these members were red or purplish.

Monstrosities were of rather frequent occurrence, the most noteworthy being a double-spathed inflorescence from Gort, one spathe being closely furled within the other. Leaf-like processes, apparently degraded pistils, occurred occasionally in the pistil-bearing region of the spadix and once amongst the pistillodes; coalesced pistils, fused two together, occurred in 5 instances; and in one case a perfect anther was found amongst the staminodes.

A marked tendency to pass from the monoecious to the hermaphrodite type of inflorescence was exhibited in a curious monstrous spadix sent me by Canon Lett from Loughbrickland. In this the usual group of pistils or female flowers appeared at the base of the spadix, their withered stigmas and depressed crowns showing that fertilization had already taken place; above these, in their normal position, came a group of pistillodes; next came a confused mixture of pistils and anthers occupying the region of the male flowers, the stigmas just matured and shining with the glutinous stigmatic secretion, while the intermixed anthers were burst so as to display the ripe pollen. Many of the pistils here bore seated on their summits a half anther, most of them were burst open and exposed to view the included ovules, and here and there an anther appeared bearing attached to it a couple of naked ovules. The staminodes forming the fourth member of the inflorescence in this monstrous spadix were quite normal both in form and position.

Sandycove, Co. Dublin.

NEWS GLEANINGS.

Biological Appointments in Dublin.

We have to record that R. Southern, B.Sc., who has worked for several years past in the Natural History division of the National Museum, Dublin, has been recently transferred to the Fisheries Office as assistant naturalist. His place on the Museum staff has been filled by the appointment of C. M. Selbie, M.A., from Aberdeen University.

OBITUARY.

MARY ISABELLA LEEBODY.

The death of Mrs. Leebody on September 19th, following on that of S. A. Stewart, deprives the North of Ireland of another of its veteran botanists. For a long period of years Mrs. Leebody has taken advantage of every opportunity that offered to improve our knowledge of the flora, especially of Derry and Donegal, the counties which lay around her home in Londonderry; and by her encouragement of others she also furthered her favourite study. Her finding of *Spiranthes Romanzoviana* at Kilrea was the first indication that that rare orchid had a wider extension of range in Ulster than was shown by its first discovery in Armagh; and the finding of several rare plants in Donegal—*Glyceria aquatica* near Ballyshannon, *Dryas octopetala* on Muckish, *Stachys Betonica* at Portsalon, *Malaxis paludosa* on Slieve Snacht, were due to her work or to the interest in botany which she inspired in others. Further from home, she added *Teesdalia nudicaulis* to the native Irish flora by her discovery of its Lough Neagh station. Mrs. Leebody took a keen interest in the work of the Belfast Field Club, and seldom missed such club excursions as were held to places within reach of Londonderry.

R. LL. P.

RICHARD PRENDERGAST VOWELL.

R. P. Vowell was one of the little band of botanists whom the enthusiasm of A. G. More inspired to undertake the systematic investigation of the Irish flora, in connection with the preparation of a second edition of "Cybele Hibernica." The "eighties" of the last century were a heroic period in the history of the botany of Ireland. H. C. Hart, R. M. Barrington, R. P. Vowell, R. W. Scully, T. H. Corry, and S. A. Stewart—it is sad to think how few of them are alive now—were all at work, and hardly an important mountain, lake, river, or promising stretch of sea-shore escaped their attention. Vowell's share in this extensive survey lay in his joining R. M. Barrington in the exploration of two interesting and then little-known areas—the cliff-walled hills of the Ben Bulbin range, and the limestone shores of Lough Ree; and the reports on these two areas, published by the Royal Irish Academy in 1885 and 1888 respectively, still remain the main source of information on the remarkable flora of those places. Though he did not publish subsequently any other contributions to our knowledge of Irish botany, Mr. Vowell retained his keen interest in the subject. His untimely death on October 30, after a brief illness, will be regretted by a large circle of friends, and by his fellow-botanists throughout Ireland.

R. LL. P.

NOTES.

ZOOLOGY.

Entomological Notes.

I have been much surprised at the absence of insects during the early autumn. I was at Loughgall on August 28th, Maghery, Lough Neagh, on September 1st, and Newcastle, Co. Down, on September 6th, all of them good localities for insects, and at none of them did I meet with any number of insects, in fact I was greatly taken aback by the scarcity which prevailed. At Loughgall by sweeping and beating herbage and trees along the lake and shore in the Manor grounds I took of beetles *Cyphon variabilis*. Thnb., *C. padi*. L., *Galerucella nymphaeae* and *Apion ervi*, Hub. : of Hemiptera *Miris calcaratus*, Fall., *Lygus Kalmii*, L., *Aetorhinus angulatus* Fall., *Aphrophora alnce*, Fall., *Philaenus spumarius*, L. and *P. lineatus* L., also some Psyllina which I have not determined yet. Besides I saw some Agrions, also *Melanippe montanata* and *Teras contaminana*. The afternoon was not favourable as there were thunder and showers. At Maghery, however, I had a gloriously fine day, but though there were some Trichoptera about, little else were to be had. Mrs. Johnson and I delved in the sand till we were tired and only got a few *Bledius subterraneus* and *Deronectes assimilis*, the latter seemed to be emerging from the pupa. Mrs. Johnson also took a solitary *Elaphrus riparius*. Among rejectamenta on the shore I saw a couple of *Philonthus marginatus*, and under stones on Derrywarragh in a fruitless search for *Pelophila* a few *Pterostichus nigrita*. At Newcastle we had a splendid day as far as weather was concerned, but except grass-hoppers nothing was much in evidence. I saw one dilapidated *Satyrus semcle* on the sandhills, also *Lycaena icarus* and *Pieris rapae*. I took three *Anaitis plagiata* and a few beetles comprising one *Sitones flavescens* and a few *Longitarsus jac bacar*, I also saw one *Broscus cephalotes* dead. The Hemiptera were represented by several *Nysius lineatus*, one *Evacanthus interruptus* and a few Psyllina. I looked carefully for *Cionus hortulanus* on *Scrophularia nodosa* but found neither beetles nor larvæ, only a few empty pupa-cases to show they had been there. There were a few Bombi about and one or two Wasps. In one way the absence of insects was not to be wondered at, for all herbage was pretty well burned up. The Bracken was fast turning brown and other things in a dying state, so that there was little to support insects or attract them either. At home I have made a few captures; *Campyloneura virgula*, that pretty little hemipteron, flew into my sitting-room and was duly captured. On the morning of the 14th August, I saw a yellow moth fluttering on one of the paths among the flower beds. It was speedily captured and on examination proved to be *Ecnomus erosaria*, a moth I had not met with here before; *Pyrausta purpuralis* was also found in my garden. I have seen single specimens of *Pyrameis atalanta* and *P. cardui* near this.

W. F. JOHNSON.

Poyntzpass.

Bernacle Goose in Co. Wexford.

On the 14th October, Mr. J. J. Perceval, of Wexford, sent to the National Museum, Dublin, a Bernacle Goose (*Bernicla leucopsis*), which had been obtained a few days previously near Kilmore, on the south coast of Co. Wexford. This Goose is a regular winter visitor to Dundalk Bay, and the north-west coast of Ireland; it has also occurred occasionally inland, but I am not aware of a specimen having been previously obtained on the south coast of Ireland.

A. R. NICHOLS.

National Museum, Dublin.

The Quail in Ireland.

While out shooting Partridges near here on September 6th, we flushed four Quail in a stubble field, three of which were shot. It is many years since I have seen a Quail in Ireland. No doubt the hot summer has brought some over.

DENIS R. PACK-BERESFORD.

Fenagh, Bagenalstown.

The Black-tailed Godwit—a Correction.

In the *Irish Naturalist* for November (*supra* p. 200) is a misleading misprint which I overlooked in the proof. "The beak was long and straight, its *prominent* part looking pink in the sunshine." For *prominent* read *proximal*, by which I meant the nasal part, next the head.

R. J. USSHER.

Cappagh, Co. Waterford.

Black Redstart in Co. Waterford.

A Black Redstart has been on this house all this morning (October 23rd) and for the last two days. Its appearance at Cappagh is becoming annual at this season when it may be looked for; its sooty body and red tail make it easy to distinguish, and it jerks its body like a chat. (See *Irish Naturalist*, 1909, p. 26).

R. J. USSHER.

Cappagh, Co. Waterford.

Introduction of the Marsh Tit and Nuthatch into Ireland.

Should any person meet with a Marsh Tit or Nuthatch in Ireland, it will be impossible to decide with certainty its origin, as I am informed that two or three dozen Marsh Tits and a pair of Nuthatches have, within the past two years, been liberated in Co. Tipperary.

RICHARD M. BARRINGTON.

Fassaroe, Bray.

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